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OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

WITH

AN ABSTRACT OF THE PROCEEDINGS AT BOARD AND GENERAL
MEETINGS, AND THE PREMIUMS OFFERED BY
THE SOCIETY IN 1921

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TRANSACTIONS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

THE POLICY OF THE AGRICULTURE ACT.[*]

By CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan.

THE Agriculture Act can only be understood, and its methods can only be aptly criticised, if it be considered throughout as an attempt to stimulate the cultivation of land.

The gradual and progressive decline of cultivation had been, for a generation, a commonplace among those interested in Agriculture; and the reduction of rural population, which had been a concomitant of this decline, had become a matter of serious concern to all well-informed observers of our national affairs. But until the effects of war shed a revealing light on our position, the facts aroused no great degree of practical interest. Rural depopulation was a phenomenon common to many of the more highly-developed countries; and the menace of a diminished food supply was concealed by the very causes which brought it about; for the reduction of tillage was a direct result of the large and increasing import of grain from distant sources, and particularly from the virgin soils of America, at prices which appeared to prohibit competitive production under British conditions; and this import, with its great, and in many ways beneficent, effect on the provision of cheap food, appeared to the population generally to render comparatively unimportant its sinister influence upon home production.

---

[*] Since this Article and the one which follows were printed, it has been intimated that His Majesty's Government propose to introduce a Bill repealing the provisions of the Agriculture Act in so far as they relate to the guarantee of cereal prices and the regulation of agricultural wages.

It is thought desirable, however, to publish the Articles, in order to preserve a record of the Policy which was adopted last year, as a result of the experiences of war, and which is now about to be abandoned.—Ed.

In previous times the British corn-grower had, since the year 1792, in which Britain had been for the last time a corn-exporting country, been subject to foreign competition; but so long as his chief competitors were European, and subject in the main to climatic conditions similar to his own, he was not vitally affected, since harvests and prices more or less compensated each other in their general effect upon his returns. A new state of matters arrived when he found himself competing with lands in which production, besides being conducted by the exhaustion of virgin soils, was carried on under climatic conditions which bore no kind of relation to his own, so that years of diminished yield in this country might easily coincide with low prices resulting from abundant crops in other lands. This very fact, however, commended itself to the urban consumer: the steadying influence upon prices, which resulted from a world-wide food supply, was a large contribution to the welfare of the industrial population, and to the development of our manufactures which resulted from the cheapening of food. The food supply of the country seemed to offer no problem in time of peace; and it did not seriously engage the attention of a nation which had for a hundred years ceased to envisage the possibility of a great war, involving issues beyond those of purely military operations, and having famine as one of its most imminent dangers.

Experience of this unexpected peril wrought marvels during the hard years of scarcity. The food supply became one of the greatest anxieties of the average citizen; and even many, who soon forgot the visions created by fasting, were for the time aware that food supply cannot safely be left to chance. It is true, no doubt, that impressions of this kind evaporate as the occasion which has created them disappears. It is no less true that the emergencies of war require different measures from the conditions of peace, and justify procedure which, in other and easier circumstances, would be unwise and indeed intolerable. But the fact remains that we have been, and indeed still are, dependent upon foreign food supplies, and negligent of the productiveness of our land to an extent that is consistent neither with national safety nor with national health.

THE LAND A NATIONAL INTEREST.

From the confusions and difficulties, from the revelations and ferments, of a war that has searched the weaknesses of our national life, one conviction, at all events, is likely to survive. It has become a commonplace that the nation has a vital interest and concern in the land of the country. Such a perception does not, indeed, mean that the State ought directly to administer the land under any of these schemes which are vaguely called nationalisation. That may or may not be the best method of giving effect to the nation's interest; and it cannot be said that the experiences of war have helped to commend it to those who did not previously approve it. But whatever opinions may be held regarding it must find common ground in the recognition that the nation's interest in the land is vital and supreme. Those who own and administer it, those who rent and till it, those who labour on it, have all their separate interests in it; and the State will do well to remember its dependence upon their efforts; but their interests are subordinate interests. They may be better or worse off, richer or poorer, as men may be in other industries; but the nation will live or die by the use it makes, or the use it fails to make, of the land, which is in the end the foundation of its real wealth and the nurse of its people.

This is indeed no new view. It is the heart and substance of every land system that belongs to civilisation. It is even the implication of primitive communal life. It is the true meaning of feudalism; and its negation in the abuses of the feudal system brought that system to an end. If it has been forgotten in recent times, the explanation lies in the extent to which the vital importance of the land has disappeared from calculations that have been governed by the growth of the industrial interests of the country. The nation's interest in the land has been allowed to lapse, partly because men have been so obsessed with material wealth that other interests have given way to it in their minds, and partly because the system of government which was thought best adapted to industrial life did not adequately allow for the assertion of national interests of other kinds.

But an interest so vital carries with it a correlative right, a right inherent in the State to subordinate the management of land to the use and need of the nation, its maintenance, its health, and its security.

It is the recognition and assertion of this interest and this right which govern the whole findings of the Report of the Agricultural Policy Sub-Committee of the Committee of Reconstruction, 1918 (generally called the Selborne Committee); and the principles of that Report are the basis of the Agriculture Act. The Act proceeds on the assumption that the State has the right and duty to render the land of the country productive to the utmost possible extent in the general interests of the community; and it cannot be too clearly understood that, whatever may be its incidental consequences, the motive and justification of the Act are not to be found in any tendency of its provisions to make farmers or landlords or labourers better off, but only in the increase of agricultural production.

THE NEED OF INCREASED PRODUCTION.

The necessity for an increased productiveness of British Agriculture was assumed in the terms of reference of the Selborne Committee, which enjoined the Committee to devise measures to that end; but the Committee found the assumption to be completely justified both in the interests of security in war and as a contribution to national wellbeing in time of peace. Increase of production, however, must be obtained primarily and chiefly by increase of cultivation, since, speaking generally, and apart from certain obvious exceptions, land capable of profitable tillage will produce more food under cultivation than under grass, whether the food to be produced be meat or milk or grain. Tillage, wherever it is economically possible, is essential to the maximum of food production. The chief agricultural problem of the nation, therefore, was, and is, to promote cultivation and to remove whatever obstacles have discouraged and restricted it during the last fifty years. The practical question is how this is best to be achieved.

A great weight of evidence has been led, during the last few years, to show that a main deterrent to cultivation is uncertainty as to its yielding an adequate return. The obstacle, indeed, was in comparatively recent times no mere uncertainty, but rather a complete certainty that no adequate profit could be looked for; and although rising prices, in the years immediately preceding the outbreak of war, had gone to restore the balance, these had not arrested the decline of cultivation, partly no doubt because they had not had time to take effect, but partly also because there seemed to be no adequate security for their continuance, and therefore no ground for confidence sufficient to remove a stubborn distrust engendered by bitter experience. Men who had suffered, or whose predecessors had suffered, the losses of the years of depression, and who had found a more profitable and safer way of living by the land, were in no mood to return to the financial perils of close cultivation, and to repeat the experience of former times. Their private interests did not seem to coincide with the need of the nation for increased production. The development of the fullest use of land, so vital to national security and so essential to the maintenance of a rural population, seemed to offer less hope of a livelihood than did the less arduous, if also less productive, methods to which it had in greater or less degree given place.

There are always those to whom, in such a case, methods of compulsion seem to offer an easy solution of all difficulties.

But in the present instance no very profound consideration was required to make it clear that compulsion could only have a very limited effect. Apart from all other difficulties, and sufficient in itself to bar effectively all hope of a large result from such a method, there is the fact that there exists no other agency for cultivating the soil of Britain than that which is offered by the farmers who now hold the land; for, while it is possible to use compulsory methods in order to bring a limited number of individuals up to the general level of an industry, it is not possible by such means to raise that general level or to govern a majority or even a large minority—to force an industry as a whole to accept a scale or a method of production which is generally believed to be doubtfully profitable. Compulsion may supplement the effect of a general assent, but the assent must first be secured.

PROTECTIVE TAXATION.

Twenty years ago, or even perhaps more recently, a large body of agricultural opinion, representing probably a considerable majority of those actively engaged in farming, would have declared unhesitatingly that the imposition of protective taxation on imported food provided the only solution of the problem of encouraging home production.

It has been a significant fact, in the discussions of the last few years, that there has been no real attempt to press this particular solution. One seeks in vain for any serious reference to it in the evidence given in the various investigations which have been carried out. Partly, no doubt, this is due to the circumstances in which the discussion has taken place; for food prices, during the progress of this discussion, have stood at a level which might well appear to prohibit the suggestion of any measure likely to raise or to maintain them; and this, of course, would be the avowed object of protective taxation intended to stimulate production. Partly also it surely points to a perception, on the part of some who might themselves see no great reason against protective taxation, that the strength of the feeling against such a policy among the industrial population renders its adoption a political impossibility. The most evident determination of the democracy is to secure cheap food; and it is a determination indefinitely hardened by the experience of the last six years.

But the real reason which makes the policy of protective taxation irrelevant to the problem of increased tillage is that it does nothing to give that which the situation requires. The producer, so far as his personal interests are concerned, might welcome the high prices which it would be intended to secure him; and, if he thought them likely to endure, the prospect might lead him to increase production. But the producer is aware of the wide gap which exists between present costs of production and the price of cereals even during the years immediately preceding the war—to say nothing of the price of 22s. 10d. per quarter for wheat in 1894—prices whose recurrence he may well regard as possible. If he calculated the proportions that any tax must assume which should give him adequate protection against a return to former price levels, he might well hesitate before acting on the likelihood that such a tax would endure under what appear to be permanent political conditions in this country. Security would not be a probable state of mind for any producer sheltered by so controversial a provision.

STATE GUARANTEES.

The suggestion that the prices of cereals should be guaranteed by the State, originally made in 1916 by a Committee on the Settlement of Sailors and Soldiers on the Land, was the policy recommended by the Selborne Committee (one member dissenting) and by a majority of the Royal Commission on Agriculture, and adopted, first, in a tentative and inadequate way, in the Corn Production Act of 1917, and afterwards in the Agriculture Act.

The substance of the policy is that the State guarantees that when average prices of cereals fall in any year below certain levels, assumed to be equivalent to the costs of production, the State shall make good the balance so as to protect the producer against all or part of his loss.

The policy may be said, as has just been indicated, to have been arrived at by a process of exhaustion or exclusion. It may no doubt be argued that no interference by the State is necessary or desirable—that the process of reduction in the cultivated area may be allowed to continue and increase, that the nation may rely on the power of a supreme Navy to protect its food supply in time of war, and on its productive energy in other directions to purchase that supply from foreign sources in time of peace, and that the profits earned in industry and commerce may enable us to dispense with a successful and productive agriculture. Or it may be maintained that no interference by the State can contend with the economic forces which tend to diminish the productiveness of our farming, that the disadvantages of such interference are so great as to outweigh any favourable influence which it may exert, or that the whole matter is inaccessible to the influence of statecraft, and is not amenable to political forces at all. These are, of course, counsels of despair so far as British agriculture is concerned. They condemn us to a steadily diminishing agricultural production, a progressively increasing dependence on foreign food supplies, grave weakness in a vital factor of self-defence, and a continuous reduction of that rural population whose maintenance and wellbeing furnish the only known preventive of racial failure.

But if we admit the necessity for maintaining a productive agriculture and the duty of the State to make every effort to encourage it, the examination of the problem which has been carried out in recent years leaves no solution open to us, so far as the financial side of the question is concerned, except that of encouraging the confidence of producers by guaranteeing them against serious losses arising from those causes which have in previous times driven their predecessors from the more productive to the less productive use of land.

It is a method which addresses itself directly to the fundamental economic difficulty; for the problem confronting us is not that of the general prosperity of those engaged in the farming industry. In other days that had been the dominant issue; but in recent times, even before the war, those engaged in the industry had contrived so to adapt themselves to altered circumstances as to find a livelihood. Our national problem now is to encourage producers to turn their energies to cultivation; and a fundamental obstacle to that is the sense of insecurity which exists regarding the prices of cereals on which the profitableness of cultivation as a whole ultimately depends. A properly devised guarantee is the only available method of counteracting that obstacle; and it is a method also which, while adequate to its purpose, is not open to the criticism that it may increase the price of food; for only the most thoughtless can suggest such an effect. A financial guarantee is no doubt a liability assumed by the citizen as a taxpayer; but it is not a burden on him as a consumer; indeed its tendency, if it be successful in stimulating production, must be to reduce prices generally by increasing supply; and if the liability should, as may not improbably happen, require to be met, the citizen will always know as a taxpayer exactly how much it has cost him to fulfil his obligation, while he will also have to meet it at a time when he has, as a consumer, the compensating advantage of a supply of food which is cheap relatively to the prevailing general scale of costs.

THE METHOD OF ADMINISTERING GUARANTEES.

A further advantage of the method of guarantee as provided by the Agriculture Act is that it meets the difficulty of production precisely where that difficulty is most acute, since it gives a greater proportional amount of help on the less than on the more productive land. The question whether the guarantee should be based on the sale or on the production of grain was one which was necessarily debated in the earlier stages of the discussion of the method. The selection of production as the basis was partly, no doubt, determined by considerations relating to administration, checking of sales being practically impossible, and partly by the fact that so small a proportion of the oat crop is sold as compared with that part which is consumed on the farms. Administrative difficulties were also highly adverse to the proposal that actual production rather than acreage cultivated should be the basis of payment; but the final arrangement, that payment should be based on the acreage of wheat or oats grown, assessed at an assumed yield of four quarters of wheat and five of oats, has the great advantage over other possible methods that, while it takes into account only part of the actual yield on the best land, for whose cultivation least inducement is needed, it in effect guarantees the price of the whole produce of inferior land, regarding whose cultivation most hesitation must arise.

It has indeed been a criticism of this method that it lays too exclusive stress on the extent and too little on the thoroughness of cultivation; and it has been suggested that this may tend to the cultivation of unsuitable land and to the growing of a greater acreage of cereals than can, in some cases, be properly cultivated. But this suggestion is probably fanciful and unreal, more especially as the cultivator cannot foresee, in arranging his cropping, to what extent guaranteed compensation will be paid, or even whether it will fall to be paid at all. It would also argue a degree of unwisdom which should not lightly be taken for granted if farmers were to rely for their profits on the guarantee rather than on the productiveness and quality of their crops.

The amount of the guarantee is a subject as to which a correct judgment must depend on a clear view of the object and justification of the guarantee policy itself. It has never been seriously argued that corn producers have any more right than persons engaged in other business to receive profits at the expense of the taxpayers; and the whole justification of the policy rests on the view that the public interest requires an extent of cultivation which will not be obtained unless those who are to undertake it are secured against losses arising from market conditions such as have existed before, and may be expected from time to time to recur.

The theory on which the policy is based points, therefore, to the conclusion that the guarantee ought not to cover more than the actual costs of production under the conditions in which it is intended to encourage it. It is evident, indeed, that the cost of production of a quarter of corn can never be exactly the same in varying conditions of soil or climate, and that any figure which in a particular year covers the cost of its production on relatively infertile land must yield a profit on land whose productive capacity is greater. But this fact is largely discounted by the arrangement under which the total sum guaranteed for each acre is the same, and represents for each quarter of corn produced a less amount in proportion to the productiveness of the land. It remains to ascertain on what basis the amount of the guarantee can be determined, so as to give a reasonable security against loss. The Corn Production Act of 1917 had already illustrated the impossibility of fixing in advance any absolute figure for this purpose, since the guarantees which it offered had never been adequate or operative; and the findings of the Selborne Committee had been avowedly tentative and subject to adjustment. The Royal Commission on Agriculture of 1919 had found it necessary to propose a method by which the guaranteed minimum should vary with the cost of production. It had investigated the general costs of production of the year 1917-18, and had applied to the costs of that year certain increases shown to have accrued in the year 1918-19. It had thus arrived at the view that the bare costs of production in 1918-19 should be estimated at 68s. per quarter of 504 lb. for wheat, 59s. per quarter of 448 lb. for barley, and 46s. per quarter of 336 lb. for oats. It had recommended that the year 1918-19 should be regarded as a basal year, and guaranteed prices should be fixed annually, for future years, by comparison of the costs of these years with those obtaining in 1918-19. It was sought by this method to provide adequate security for the producer, while giving to the proposed guarantees such flexibility as should keep them in relation to annual variations in costs. This is the method adopted in the Agriculture Act, which, however, limits the guarantee to wheat and oats, excluding barley from its operation. It does not appear that any other method could be expected to preserve the necessary relation between the costs of production and guaranteed prices.

THE CONTROL OF CULTIVATION.

The same part of the Agriculture Act which makes provision for the guarantee of minimum cereal prices provides further for the exercise by the Ministry of Agriculture and the Board of Agriculture for Scotland of certain powers of supervision and enforcement of proper cultivation. These powers do not extend to the enforcement of any change in the general use made of the land. They do not, for example, enable any increase of cultivation to be made compulsory. They are limited to the enforcement by the departments of State of the maintenance of any holding in a state of efficiency for the purpose for which that holding is intended and equipped.

Even this modest provision, however, has caused considerable disquiet in many quarters; and it may be permitted to point out two considerations which may allay misapprehensions and exaggerated expectations. In the first place, it should be remembered that compulsion of any kind can only operate within limits. It cannot be applied to any industry as a whole; it cannot impose a new standard, since the only basis it can find is that generally accepted within the industry itself, and its only possible mode of action is to bring up to the recognised standard those producers who are found to be far below it. In the second place, not only the provisions of the Act but the very facts of the case make the action of the Departments of State dependent on the co-operation of Agricultural Committees. Without the help of these Committees, the Departments could not, even if they desired to do so, exercise any effective compulsion; so that the Act really provides for what is capable of becoming self-government of the industry. If those concerned exercise a proper vigilance in the selection of the Committees, they will themselves be, in effect, the authorities under whose guidance the departments will discharge their compulsory functions.

THE FUTURE OF THE GUARANTEE POLICY.

Two questions present themselves with regard to this very important part of the Act. In the first place, it may be asked whether the guarantee policy is likely to effect its main object in any considerable degree. The matter is one in which we have no experience to guide us. It is no doubt true that the Corn Production Act, which has been in operation for four years, has had no direct result in increasing cultivation; but the consideration is irrelevant, since the guarantees provided by that Act have so far borne no relation to the costs of production, and have always been much below current prices. The fact that such an Act has been inoperative teaches us nothing as to the possible effect of a quite different guarantee based upon costs and maintaining a definite relation between the prices of cereals and the cost of their production. We are left dependent for our judgment on our estimate of the mentality of the producer.

There are, indeed, limits to the sphere in which such a policy can operate. It is not likely to create an industry of arable cultivation in localities where, for good reasons or bad, such an industry does not already exist; and there are, unhappily, large areas in England of fertile land which is not cultivated at all, and which is occupied by tenants who have neither the equipment nor the skill which would enable them to undertake arable farming. It is also probable that the guarantee will be without effect in increasing or maintaining cultivation in districts where the average yield of cereals falls below the point at which the guaranteed price makes their growth profitable. But this need not be regarded as a defect or failure of the Act, since it is not, in ordinary circumstances, desirable to encourage or stimulate any production which is a bad expenditure of capital or labour.

In point of fact, all that can safely be said of the policy of guarantee is that it removes what has been alleged by the representatives of agricultural producers as a whole to be a main cause of diminished cultivation—the paralysing uncertainty as to the course of prices which has been the normal condition for many years past.

In this connection one provision of the Act gives, in conformity with a recommendation of the Majority Report of the Royal Commission, a kind of security which has never previously been contemplated. The provision by which an Address by Parliament may terminate the operation of the Act on four years' notice does not, indeed, in theory appear to preclude the more rapid repeal of the Act, since no such arrangement can bind a future Parliament; but it creates a practical and moral certainty that the producer will have four years' notice before the security given him by the guarantees is removed; and this means that he is assured a full opportunity of reconsidering his farming policy, and withdrawing his capital from arable farming in greater or less degree as he may think prudent. The arrangement was, of course, indispensable if the guarantees were to be effective. But it may fairly be regarded by every producer as a ground for believing that his reliance on the Act cannot lead him into any kind of financial trap, since he has a whole rotation in which to accommodate his practice to an alteration of public policy.

This consideration has an important bearing also on the other question with which the Act confronts us—the question what course events are likely to take if and when the guarantees become operative. There are, of course, those who, blinded or made forgetful by the long continuance of high prices, have supposed that these would continue indefinitely. The minority of the Royal Commission on Agriculture must read with a sceptical interest, even now, their cheerful prophecies of a year ago that cereal prices would long remain above "a level unremunerative to the farmer." It is apt to be forgotten that not merely the general fall in prices, always inevitable and now in active progress, but also the place which cereal prices occupy in the general scale of values, affects the probability of an actual resort to the guarantee. If it be not certain, it is at all events in the highest degree probable, that the guarantee will, at some time and in some degree, become operative, and fall to be paid. It may safely be foretold that, if and when that happens, the question of the continuance of the guarantee will in some degree arise; and if the payment of the guarantee were to become frequent or regular, that question would grow more and more insistent. In a world which is so largely composed of misunderstandings, it would be a foolish optimism to ignore this likelihood, more especially since the event would reasonably be regarded as a clear indication that British corn production had for some reason become permanently less efficient than that of other lands. It is unlikely that a permanent endowment of corn production would be found to be politically possible.

It is, no doubt, extremely improbable that the price of cereals will become permanently less than the cost of producing them in this country, since it is likely that, for years to come at all events, the costs of transport and the balance of exchange will tend to compensate any factors which may give an advantage to foreign competitors; and the improvement of production, if proper steps be taken to promote it, may be expected to have an increasing influence. Yet we cannot omit from our calculations the possibility that the guarantee policy may in certain contingencies become impossible to maintain. In such an event we might have to recognise the imminence of national disaster. We should not indeed in this respect be worse off—probably we should be better off—than we should have been if we had not attempted the policy; but we should have failed to attain our main objects, and we should have lost the hope of an agriculture of the maximum productive efficiency. In one vital respect, however, especially we should be in better case than that in which the lack of a guarantee would have left us; for the four years' notice of the termination of the guarantees would secure to the producers at least so much opportunity of escape from an unprofitable branch of farming as their other circumstances might enable them to make use of. We should have to face a diminished but not a ruined agriculture; and farmers would have left to them the possibility of turning to other uses the capital released from arable farming, although the employment of labour on the land would be greatly diminished.

The suggestion of such possibilities, however, ought not to shake the normal and reasonable expectation that the production of cereals will continue to be, as it was in the years immediately before 1914, a profitable use of labour and capital, that cereals will maintain a reasonably satisfactory place in the general scale of prices, and that their producers, secured against losses arising from unforeseen market conditions, though only on rare occasions having to fall back on the guaranteed prices, will be encouraged to maintain, if not the extreme height of production made possible by war prices, and necessary by war exigencies, at all events such a scale of cultivation as will remove from our agriculture the reproach of unproductiveness, and keep us in possession of an industry adequate to secure our food supply in war, and to retain a prosperous population on the land in peace.

WAGE CONTROL.

The Agriculture Act renders permanent, so long as it remains in force, the provisions of the Corn Production Act with reference to the employment of farm labour. It is, indeed, an essential element in the policy of guarantee that it should be associated with some form of wage control adapted to secure to the farm worker reasonable conditions of life.

Minimum wages, like guaranteed prices, fall so far, for the most part, outside our experience, since the prevalent rates have usually been in excess of the minimum. But it may be said that while the majority of employers would greatly prefer to adjust these matters individually, there are many who recognise advantages, particularly in the circumstances of the moment, in that degree of collective agreement which has become general through the arrangements arising from the operation of the Corn Production Act. It is evident that prices cannot return to the level to which they rose through the exigencies of war, and that this makes it necessary, if production is to be maintained, that money wages, whose purchasing power will increase, should also fall. There are evident advantages in a collective regulation of this process, which must otherwise lead to considerable friction and disturbance of relations. It must also be recognised that we live in a world much changed in its whole outlook upon questions relating to labour and employment, and that these questions must for good or evil assume a form in many respects different from that which they have hitherto taken. The maintenance of the old methods is no longer one of the possible alternatives. It may, in fact, be accepted as certain that, if labour of the best kind is to be retained on the farms, better security than has previously existed must be found for the maintenance of a satisfactory standard of life; and it appears that the choice really lies between some such arrangement as has now been arrived at and a much greater development of Trades Union methods in farm service than has hitherto been contemplated. Now, whatever may be the case in other industries, the full application of Trades Union methods to agriculture would be fraught with peril, and might easily render the whole developed system of farming, in so far as it rests on the employment of hired labour, altogether impracticable. Strikes, which are the ultimate resort in trade disputes, have the most serious influence on the prosperity of industry generally, and entail frequent and incalculable losses; but their occurrence, or the liability to their occurrence in agriculture, would be not merely injurious but fatal. If it were only in order to prevent them, it is essential to make some provision for deciding those questions affecting the wages and conditions of labour regarding which employer and employed, however real and considerable their common interests may be, are never likely to be in complete accord. It is to the improvement of methods of securing this object, rather than to blind resistance to inevitable changes, that the efforts of those responsible for the guidance of agricultural opinion ought to be addressed.

Land Tenure.

No other aspect of agricultural policy has excited an interest, on the part of farmers, comparable with that which they have felt in the questions of land tenure and compensation for improvements and for disturbance. Successive Acts for dealing with these questions have left behind them still a state of affairs which no one was able to regard as satisfactory—and which was always aggravated by the patent fact, that every arrangement that was made appeared, in the final result, to be more advantageous to the bad farmer than to the good, and conducive rather to the discouragement than to the promotion of a productive agriculture. From the outset of the war-time discussion of Agricultural Policy, it became evident that these questions were more in the minds of tenant farmers than the other problems which have just been discussed. Indeed, it may be said that in 1916 the majority of farmers were frankly uninterested in the policy of price guarantees, which was directed much less to their personal difficulties than to national problems, and that they were really preoccupied with the questions of tenure and compensation which affected them more obviously.

But while these questions had long been eagerly canvassed, they became much more acute as a result of war conditions, which greatly aggravated the risks of disturbance. While in Scotland a considerable degree of security had always been given by the existence in most districts of long leases, the great bulk of English tenancies had run only from year to year; yet, even in the absence of any legal right, there had existed a very general sense of security of tenure. There were, no doubt, cases of capricious eviction, although these appear on investigation to have been few; and there were instances in which the fear of eviction prevented tenants from exercising their rights under the Ground Game Act, and compelled them to tolerate an unreasonable over-preservation of game. But there was a very strong and general tradition against the eviction of tenants. Indeed, it has been a frequent and sometimes a well-justified criticism of proprietors that they were remiss in the discharge of their responsibilities, and tolerated bad farming on the part of tenants, who should have been compelled either to improve their methods or to quit their holdings.

The result of war went far to alter this state of affairs and to shake the existing sense of security of farm tenure. Land had for long been a bad investment of the capital of its owners. The low interest which it returned was heavily burdened by Imperial and Local taxation, and by the cost of maintaining its fixed equipment. It had, as a form of property, been surrounded by controversy; and recent legislation had tended to emphasise this. Land ownership had been a costly luxury, and was retained much more frequently as a matter of family pride and tradition than from purely economic motives. Under war conditions its cost became prohibitive. The suspension of sport cut off what had been a considerable source of revenue. Interest on mortgages, costs of maintenance, and taxation rose steadily and rapidly. The agitation for some kind of fixity of tenure was an additional disturbing factor. Sales of land became more and more frequent, especially as there were found to be many purchasers, both willing and unwilling, and prices were freely paid which made the former owners much better able than they had previously been to bear the rising costs of living and the growing burden of taxation.

Many of the purchasers were the existing tenants, who, emboldened by prosperous times and possessed of new capital, thought it better to buy their holdings than to see them pass into other hands at a time when their occupancy was very profitable. Others, however, were speculative buyers; and these were seldom prepared to respect the tradition which had been the farmer's chief safeguard against eviction.

From 1916 onward the demand for greater security of tenure had become a dominant factor in the agricultural situation. While the great loss of confidence, resulting from sales of land, was the chief cause of the growth of interest in the subject, a further contributing cause was the great increase in the cost of agricultural production. Rising prices of artificial manures and feeding-stuffs, higher wages, and therefore more costly tillage, led to a state of matters in which the cultivator was called upon to stake a much larger capital in production than had previously been involved. At the same time, he was called upon to increase the area of his cultivation; and while, no doubt, the additional production was profitable and the farmer was generally anxious on personal as well as on patriotic grounds to undertake it, any doubt as to the security of his tenure exposed him to the risk of a greater loss, through inadequate compensation for disturbance, than he had had to contemplate in other times.

This was an aspect of the case which evidently involved issues of public importance as well as those personal to the tenant; for production had become a vital matter, not only for the nation's endurance and success in war, but also for its future welfare and prosperity, and anything that tended to discourage it was contrary to public policy.

The Agricultural Holdings Acts had ceased to be regarded as satisfactory even before their working was subjected to the strain of war. Their compensations often seemed to bear little real relation to the actual value of the improvements made in a holding over a long period. Awards made under them were often capricious. Their operation was expensive. But in particular they took no note of an essential fact of the situation. They provided compensation for the improvements made by a tenant; but they made, and were intended to make, no provision for the loss or interruption of his career. Now this interruption may be an incident, in some cases, of little account. Indeed, many tenants voluntarily leave their farms in order to go to holdings which are larger or otherwise more desirable. But in other cases, it may be a matter not less serious than the loss of capital spent in improvements. It may involve a period of complete unemployment if no other holding can be found; or it may mean departure from a district in which special experience, personal connection, and reputation have come to be assets of real importance.

The subject affects personal interests so directly that its discussion has been unhappily obscured by a certain degree of heat and suspicion; and disputants have sometimes been apt to mistake its intrinsic difficulties for prejudice or bad faith on the part of their opponents. In point of fact, its real difficulties become apparent, whenever it is approached on its practical side.

It is impossible to evade the fact that eviction from a farm (whether it be justified or not) may be a serious loss. On the other hand, no reliable method of assessing this loss has ever been suggested.

Two definite ways of dealing with the problem were proposed in the discussion which took place during the years preceding the passing of the Agriculture Act.

There was a proposal, in the first place, that every occupier of agricultural land should have a statutory right to occupy it so long as he continued to farm it up to an approved standard and to pay an agreed or arbitrated rent; and supporters of this proposal distinguished it from Fixity of Tenure, in the Irish sense, on the ground that it was intended that, while the occupier might bequeath his interest, he should not be permitted to sell it; but continued examination of this proposal revealed very serious difficulties in it. The general evidence of those concerned in land-ownership made it plain that proprietors of land so removed from their administration would cease to be willing to spend money on its fixed equipment, the provision of which would thus be borne inevitably by tenants who (or whose heirs), when they desired to surrender the holdings, would be unable to sell the interest which had derived its value from their expenditures.

It seemed inevitable that this system, once in operation, should develop into one similar to that created by the Irish Land Acts, the undesirability of which was a matter of general agreement.

The other suggestion was that the matter should be dealt with on a basis of compensation; and this is the method on which the Agriculture Act proceeds. The first, perhaps excessive, proposals of the Bill were very considerably curtailed by Parliament, and the compensation limited to an amount equivalent to one year's rent. The Act, in point of fact, gives effect to a compromise arrived at in order not to imperil its passage; and it is probable that any further legislation on this aspect of tenancy will proceed by the further definition and development of this compromise rather than by a more abrupt departure from the system itself.

The Agriculture Act thus embodies a policy which may be described generally as one of stabilisation. It creates machinery for establishing a balance between the price of cereal crops and the cost of their production, and for adjusting the rates of agricultural wages. It gives to the tenant farmer a more settled prospect of retaining his holding than has hitherto been secured to him by law, since it gives him compensation for any disturbance which is not justified by his failure to discharge his duty as a tenant.

CONSTRUCTIVE POLICY.

It must be recognised, however, that these measures are only calculated to remove certain ascertained obstacles to production, and that in themselves they do nothing directly for the improvement of agriculture. They make no contribution whatever to a constructive policy. They do, indeed, tend to the establishment of that confidence without which no constructive policy is likely to attain its full result. But they have never been put forward by those most responsible for recommending them as furnishing any approximation to a complete policy, or anything more than a set of conditions likely to be favourable to the operation of active measures of improvement.

It is to these active measures that we must, in the end, look for the increase or even the maintenance of arable farming. Mere security against certain risks can in itself give no inducement to prosecute a difficult calling; the guarantee of a price estimated barely to cover the cost of production is no sufficient basis for any industry; and the only real encouragement to cultivation is to render it profitable. The events of the war have shown that the men who work the farms of Scotland are well fitted to carry out successfully the policy of increased production which Parliament has declared to be essential; but the previous condition of agriculture, and the subsequent tendency to allow land to go down to grass, show no less clearly that the profits of cultivation have not been adequate to cover its risks and reward its labours. While the abnormal risks are now to be diminished, it is essential also that the normal profits should be increased; and there is no way of effecting this except the improvement of production. That there is room for this improvement stands in no kind of doubt. Strong on its personal side, conducted on the whole with skill and resource, Scottish farming is miserably ill equipped technically and scientifically; and it is for this reason that it tends steadily to those uses of land which can be profitably conducted with the least amount of scientific knowledge.

This is a state of matters for which those who prosecute the industry are not themselves responsible. It is from sheer lack of opportunity that one of the best educated rural populations in the world remains without adequate scientific knowledge of its own chief calling.

It is no doubt true that this lack of opportunity has in its turn bred a certain reluctance to accept instruction, that a knowledge of scientific Agriculture has been so rare that until recently the man who attempted to acquire or practise it stamped himself as somewhat singular, and came under the suspicion of being unpractical. Neglect to provide education never fails to bring education into contempt. But this evil tradition is in some degree broken down; and the general body of farmers are more willing now than they have ever previously been to accept agricultural instruction for themselves and their families. It remains for the State to take the necessary steps to make education available. An education which is to increase the profits, by diminishing the costs, of production must be directed primarily to improvement of the crops and stock of the farms, and to the use of labour-saving machinery. It must also stimulate the adoption of those co-operative methods of sale and purchase which are achieving so much for the Agriculture of other lands; for buying and selling play a progressively increasing part in the management of the modern farm. The farm is no longer the simple self-sustaining institution that it once was; if it is to be conducted with the best economy, and not merely in the easiest and least thoughtful way, its trade must be a large element in its success; and the larger the volume of its buying and selling, the more vital does it become to effect those economies in trading which can only be attained by co-operative organisation.

These are all matters in which Great Britain generally lags behind every other progressive country in the world; and they lie at the very root of economy and profit in agricultural production.

But not only has there not been any adequate attempt to give agricultural instruction of a technical and practical kind to those engaged in the work of the farms; there is even a sense in which it may be truly said that systematic Agricultural Education has not yet begun. The Agricultural Colleges are doing excellent work; but they are neither designed nor equipped to do all the necessary work of agricultural education. They are conceived as farmers' colleges; and it is even made a reproach against them that they train an undue proportion of their students up to a point at which scientific and educational work become more attractive to them than farming. In point of fact, there will never be the best instruction for farmers until there is a body of highly-trained experts educated to a point far beyond that to which our present efforts aspire or should attempt to bring the majority of the college students. The fact that a proportion of these students do attain such a level proves not that the present educational institutions are adequate, but that use could be made of much more advanced opportunities.

Popular education, even the most elementary, depends really on the impulse of a highly-developed knowledge. That is the central fact of its history, and it repeats itself in every phase. Agricultural Education will never be adequate to its simplest purpose, will never permeate and inform the industry, unless it is allied with a wealth of high specialism and the ambitions of research.

Research is thus the supreme factor in Agricultural education; but it is much more than this, and it is because British research in Agriculture has been neglected and starved that British Agricultural Education is lifeless and British agricultural production is wasteful and costly. We have been content, in Agricultural Research, to live, in large measure and for many years, as a parasite dependent on the work of Europe and America, because as a people we have not had hope or faith in the tilling of the soil, and have occupied ourselves too exclusively with other pursuits. If the Agriculture Act means a new view of the industry of Agriculture, then that new view should express itself in a new liberality towards education and research.

Meantime these are the missing elements in the policy of the Act. Without them it will not fructify, and no enduring advantage can come from it.

As in the case of Agriculture itself, so in the case of its researches, we are equipped with men well able to undertake the work; but their employment is a public and not a private duty. Such a development of Agricultural Research and Education as has been indicated lies beyond the scope of private effort, and is essentially a duty of the State. It would be a poor and false economy to frustrate the policy of Parliament, and allow our Agriculture once more to fall into decay for lack of the comparatively small expenditure which is required in order to develop its fullest productive powers.

THE AGRICULTURE ACT, 1920.*

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This Act (afterwards referred to as "the present Act") mainly consists of amendments to the Corn Production Act, 1917, and, so far as Scotland is concerned, the Agricultural Holdings (Scotland) Act, 1908, and being a striking example of legislation by reference, is not easily followed. That being so, it is desirable that an attempt should be made to explain its leading provisions as clearly and concisely as possible. That is the object of this article. References to "the Board" mean references to the Board of Agriculture for Scotland.

I.—Amendment of the Corn Production Act, 1917.

The present Act extends the endurance of the Corn Production Act indefinitely till Parliament shall otherwise determine, subject to a power in the King by Order in Council, on an address by both Houses of Parliament, to terminate the whole Act (the Corn Production Act), including wages committees and minimum rates of wages, on the expiration of the fourth year subsequent to the year in which the Order is made. Obviously Parliament can ignore this provision, and repeal the Act in whole or in part at any time.

The present Act also brings into active operation, as from 1st January 1921, Part IV. of the Corn Production Act, as amended. That is the part which gives power to enforce proper cultivation.

Reference will now be made to the leading amendments.

(1) *Guaranteed Prices.*

The first important change takes the place of Sub-Section (1) of Section 2 (repealed) of the Corn Production Act, and relates to what may be characterised as guaranteed minimum prices of wheat and oats. By that Act these prices (now repealed) were definitely fixed for the years 1917 to 1922 inclusive. By the present Act there is provision for appointing three Commissioners—one by the Ministry of Agriculture and Fisheries and the Board of Agriculture for Scotland jointly, and one by each of the Treasury and the Board of Trade. These Commissioners have the duty, after the harvest of

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* See Footnote, p 1.

1921, and in each subsequent year, to fix the minimum prices of wheat and oats for each year beginning with 1921. As a basis, they are given what are called standard minimum prices for the year 1919—viz., wheat 68s. per customary quarter of 504 lb., and oats 46s. per customary quarter of 336 lb., and the Commissioners are directed to fix the minimum prices on a basis in proportion to the increase or decrease in the cost of production in the particular year, as compared with the cost of production in the standard year 1919. Variations in rent are not, however, to be taken into account, except such variations as are attributable to variation in the cost of maintenance.

The minimum prices being fixed in the manner indicated, the Government undertake, in terms of the Corn Production Act, that, if the average price for wheat or oats in any year, commencing with 1921, is less than the minimum price as fixed by the Commissioners, the occupier of any land on which wheat or oats have been produced in that year shall be entitled to be paid by the Board, in respect of each acre on which he proves that wheat or oats have been so produced, a sum equal, in the case of wheat, to four times, and in the case of oats, to five times, the difference between the average price (ascertained in accordance with the Act for the seven months beginning 1st September) and the fixed minimum price per quarter.

(2) *Power to compel Proper Cultivation.*

The next important change takes the place of Section 9 of the Corn Production Act, and relates to powers to enforce proper cultivation.

Where the Board, after consultation with the Agricultural Committee for the area, are of opinion that any arable or grass land (not being a park, garden, pleasure ground, or land adjoining a mansion-house, or garden attached thereto and required for their protection or amenity, or woodlands) is not being cultivated according to the rules of good husbandry (as afterwards defined), or that the production of food on such land can, in the national interest and without injuriously affecting the persons interested in the land, or altering the general character of the holding, be maintained or increased by an improvement in the existing method of cultivation, or that the occupier of the land has unreasonably neglected to execute thereon the necessary works of maintenance (afterwards defined), which he is liable to execute in terms of the conditions of his tenancy, or which have been rendered necessary by his act or default, or that the owner of land in occupation of a tenant has unreasonably neglected to execute necessary works of maintenance, not being works which the occupier is liable to execute—in all or any of these events the Board may by notice call upon the party responsible to execute the necessary works (provided that the Order, so far as requiring the maintenance or clearing of drains, embankments, or ditches, is not to be operative in so far as the execution of the work is rendered impossible by reason of the subsidence of any land, or the blocking of outfalls, which are not under the control of the persons on whom the Order is served), or to do what may be necessary to secure that the cultivation would be conform to the rules of good husbandry (as afterwards defined), or for securing an improvement in the existing method of cultivation (but not so as to interfere with the discretion of the occupier as to the crops to be grown).

No action can be taken by the Board under any such notice unless a full report by the Board, setting out in detail the matters complained of, and the improvements and works required, has been served on the owner or occupier.

Any person aggrieved by any such notice is given right to have referred to arbitration the question whether the circumstances justify the Board in issuing the notice. If the person responsible unreasonably fails to comply with the requirements of such a notice, he may be prosecuted and subjected to a fine of £20, and a further fine of not exceeding 20s. for every day during which default continues after conviction. Further, the Board can execute any work specified in the notice, and recover the cost from the person in default, or where the landlord fails to execute the work specified in a notice which falls on him to execute, the Board may authorise the occupier to do the work and recover the cost from the landlord.

(3) *Necessary Works of Maintenance.*

The "necessary works of maintenance" referred to above mean such of the following works as are necessary for the proper cultivation and working of the land, and are capable of being executed without prohibitive or unreasonable expenditure—viz.:

(*a*) The maintenance and clearing of drains, embankments, and ditches.

(*b*) The maintenance and proper repair of fences, stone walls, gates, and hedges.

(*c*) The execution of repairs to buildings.

(4) *Estate Mismanagement.*

Where a landlord grossly mismanages his estate, the Board may appoint a manager of the estate or any part thereof, excluding (except with the consent of the landlord) mansion-house or the garden or grounds attached thereto, or any land which at the date of the Order forms part of any park attached to and usually occupied with the mansion-house and required for the amenity or convenience thereof, or any land or buildings which are not used for agricultural purposes, and also (except with consent) any sporting rights which do not interfere with the production of food. Such manager is to have no power to sell or create any charge on the estate, or to cut or sell timber, except with the consent of the owner, or with the approval of the Court of Session. The owner may at any time after the expiration of three years from the date of the Order, or after any change in the ownership, apply to the Board to have the Order appointing a manager revoked, and if this be refused, he may appeal against the refusal to the Court of Session. The Board is, however, bound, on the application of a purchaser of any land subject to the provisions of the Order, to revoke the Order.

If within a month after a manager has been appointed the owner so requires, a record of the condition of the buildings, fences, gates, roads, ditches, and cultivation of the land shall be made, within three months after the date of the requisition, by a person, in default of agreement, appointed by the Sheriff-Principal, and, failing agreement as to the cost of making the record, the cost is to be borne by the Board and the owner in equal portions.

(5) *Injurious Weeds.*

The Board are also given power to order the occupier of land to cut down or destroy injurious weeds in the manner and within the time specified, and where the occupier (who, in the case of any public road, is the authority by whom the road is maintained, and in the case of unoccupied land, the person entitled to the occupation thereof) unreasonably fails to comply, he may be prosecuted and subjected to a severe fine. The Board may also execute the work, and charge the cost to the occupier in default.

(6) *Agricultural Committees.*

The Agricultural Committees are required to furnish annually to the Board full accounts of their expenditure, and the Board are required to submit the returns to Parliament, or a sufficient abstract of them.

The Committees are also authorised to delegate certain of their powers to Sub-Committees.

No member of an Agricultural Committee is to take part in any decision of the Committee which relates to land of which he is the owner or occupier or the agent of the owner or occupier, or to any bargain or contract contemplated or entered into by the Committee in which he is directly concerned.

(7) *Arbitration under Part IV. of the Corn Production Act.*

Where an arbiter states a case for the opinion of the Sheriff Court on any question of law, the opinion of that Court is to be final, unless within the time, and subject to the conditions prescribed by Act of Sederunt, either party appeals to either Division of the Court of Session, from whose decision there is no appeal except with leave of the Division.

In the stated case, *A. J. Mitchell-Gill* v. *W. A. Buchan*, the First Division of the Court of Session, on 5th February 1921, held that an arbiter had no alternative but to act in accordance with an opinion pronounced by the Court on a question of law arising in an arbitration under the Agricultural Holdings (Scotland) Act, 1908. This decision is also binding on arbiters acting under Part IV. of the Corn Production Act.

II.—Amendment of the Agricultural Holdings (Scotland) Act, 1908.

(1) *Holdings to which Part II. of the Present Act Applies.*

By Section 35 of the Agricultural Holdings (Scotland) Act, 1908 (afterwards referred to as " the Act of 1908 "), " holding " is defined as—

> " any piece of land held by a tenant which is either
> " wholly agricultural or wholly pastoral, or in part agri-
> " cultural and as to the residue pastoral, or in whole
> " or in part cultivated as a market garden, and which
> " is not let to the tenant during his continuance in any
> " office, appointment, or employment held under the
> " landlord."

Such holdings are affected by Part II. of the present Act with the addition undernoted.

Section 24 (1) of the present Act provides that where land comprised in a contract of tenancy is not a holding within the meaning of the Act of 1908, by reason only of the fact that the land so comprised includes land (hereinafter referred to as " non-statutory land ") which, owing to the nature of the buildings thereon, or the use to which it is put, would not, if it had been separately let, be a holding within the meaning of the Act of 1908, the provisions of that Act relating to compensation for improvements and disturbance, unless otherwise agreed in writing, shall apply to the part of the land exclusive of the non-statutory land, as if that part were a separate holding. This is a rather involved provision, which may be paraphrased thus: Land not wholly agricultural or pastoral, or not wholly agricultural and pastoral, may be a holding to the extent that it is agricultural or pastoral to the exclusion of that part which is non-agricultural or non-pastoral (non-statutory land). This only applies under contracts of tenancy made after 1st January 1921. A question may arise as to whether compensation in this case is limited to that allowed under the Act of 1908, as if that Act had not been amended. As that Act and Part II. of the present Act fall to be interpreted together, it is thought that the answer should be in the negative. It will be noted that in this case contracting out is competent.

Compensation for disturbance is limited to that (if any) which could have been claimed had the present Act not been passed, in the case of any land which forms part of any park, garden, or pleasure ground attached to, or usually occupied with the mansion-house, or required for its protection or amenity, or any permanent grass park held for the purposes of a business or calling not primarily agricultural or pastoral, including that of butcher, cattle-dealer, and the like.

(2) *Fundamental Section of the Act of* 1908 *Amended.*

Section I. of the Act of 1908, which conferred the right to compensation for improvements, is amended, per Schedule I. of the present Act, to read as follows (the italicised words constituting the amendment) :—

> " Where a tenant of a holding has made thereon any " improvement comprised in the First Schedule to this " Act, *and the tenancy was entered upon after the* 1st *day* " *of January* 1921, *whether the improvement was or was* " *not an improvement which he was required to make by* " *the terms of his tenancy*, he shall, subject as in this Act " mentioned, be entitled at the determination of a tenancy on quitting his holding to obtain from the landlord " as compensation under this Act for the improvement, " such sum as fairly represents the value of the improvement to an incoming tenant."

It is not doubted that the intention of this amendment was merely to give right to compensation for contracted-for improvements, but to restrict such right to new leases.

The amendment, however, goes much further, and appears to exclude compensation for all improvements, whether contracted for or not, under all leases except those entered into after 1st January 1921. This is being put right by the Agriculture Amendment Act, 1921.

(3) *Scheduled Improvements.*

(1) Part 1 of the First Schedule to the Act of 1908, which embraces improvements to which the written consent of the landlord is required, has had added to the end of it—

" (16*a*) Provision of permanent sheep-dipping accommodation.

" (16*b*) In the case of arable land, the removal of bracken, gorse, tree-roots, boulders, or other like obstructions to cultivation."

(2) Where the landlord fails to consent to the tenant making any improvement comprised in Part I. of the Schedule (other than the erection, alteration, or enlargement of buildings, or an improvement comprised in the Third Schedule, which relates to market gardens), which is declared by regulations made by the Board to be an improvement to which Section 15 (1) of the present Act applies, the Agricultural Committee of the area may, after certain procedure, direct that the improvement be treated in the same manner as drainage improvements comprised in Part II. of the Schedule. A draft of any such regulations must be laid before Parliament not less than thirty days during which Parliament is sitting, and on an Address by either House to his Majesty no further proceedings may be taken thereon.

(3) The item in Part III. of the same Schedule relating to temporary pasture is amended to read thus (the italicised words being the amendment) :—

" (26) laying down temporary pasture with clover, grass,
" lucerne, sainfoin, or other seeds, sown more than two
" years prior to the determination of the tenancy, *in so*
" *far as the value of the temporary pasture on the holding*
" *at the time of quitting exceeds the value of the temporary*
" *pasture on the holding at the commencement of the tenancy*
" *for which the tenant did not pay compensation.*"

(4) *Compensation for High Farming.*

If a tenant who quits possession after 1st January 1921, and has given notice in writing before the termination of the tenancy of his intention to claim, proves that the value of the holding to an incoming tenant has been increased during the tenancy by the continuous adoption of a standard or system of farming which has been more beneficial to the holding than the standard or system (if any) required by the contract of tenancy, an arbiter appointed under the Act of 1908 as amended, may award to the tenant such compensation as, in his opinion, represents the value to an incoming tenant of the adoption of that standard or system. This compensation is not, however, payable, unless a record of the condition of the holding has been made under the Act of 1908, or in respect of any matter arising before the date of the record. (Although Section 24 of the Act of 1908, being the only section under which the record could be made, has been repealed, it is thought that the record can be made under Section 26 of the present Act, because Part II. of the present Act is directed to be construed as one with the Act of 1908.) The arbiter is expressly directed, in assessing the value of this improvement, to make due allowance for any compensation agreed or awarded to be paid to the tenant for any improvement specified in the First Schedule to the Act of 1908, which has caused or contributed to the improvement. In short, the tenant is not to be paid twice over for the same improvement.

(5) *Market Garden Improvements.*

Where a tenant (even the tenant of a farm) desires to make on his holding, or part thereof, any improvement comprised in the Third Schedule to the Act of 1908 (market garden improvements), and the landlord refuses, or within a reasonable time fails to agree in writing that the holding or part shall be treated as a market garden, the Agricultural Committee of the area (or in the option of either party an arbiter appointed and acting under the provisions of the Act of 1908 as amended) may, on the application of the tenant, and after hearing the landlord or his representatives, and after being satisfied that the holding or part is suitable for the purpose of market gardening, direct that Section 29 of the Act of 1908 (special provisions as to market gardens) shall either, in respect of all or some of the improvements comprised in said Third Schedule, apply to the holding or part; but compensation is only to be allowed in respect of such improvements where they are executed after the date on which the direction is given. The direction is not to confer authority to break up meadow-land or pasture.

Any such direction shall be subject to such conditions (if any) for the protection of the landlord as the Committee may think fit, and where any such direction is given, certain provisions specified in the present Act are to have effect. The chief of these provisions is, that where the tenancy is terminated by notice to quit given by the tenant, or by reason of the tenant becoming notour bankrupt, or granting a trust deed for behoof of his creditors, the tenant is not to be entitled to compensation for such improvements as are specified in the direction, unless the tenant, not later than one month after the date of the notice to quit, or of the bankruptcy or granting of trust deed, as the case may be, or such later date as may be agreed, produces to the landlord an offer in writing (being an offer which is to hold good for three months from the date of its production), by a substantial and otherwise suitable person, to accept a tenancy of the holding from the termination of the existing tenancy thereof, and on the terms and conditions of that tenancy so far as applicable, and to pay to the outgoing tenant all compensation payable under the Act of 1908, or under the contract of tenancy, and the landlord fails to accept the offer within the three months. This is practically what is known as the "Evesham Custom."

If the landlord accepts the offer, the subsequent procedure and conditions prescribed by the Act are to be followed. It is, however, important to note, that the landlord's acceptance is not to be held to create a new tenancy for the purposes of the Act relating to demands for arbitration as to rent.

(6) *Benefit.*

Sub-Section 2 (*a*) of Section 1 of the Act of 1908 provides that in the ascertainment of the compensation payable by a tenant for improvements, there shall be taken into account any benefit which the landlord has given or allowed to the tenant in consideration of the tenant making the improvement. This is amended per Schedule I. of the present Act to the effect that benefit is to be taken into account "whether expressly stated in the contract of tenancy to be so given or allowed or not." Accordingly, any benefit proved to have been given or allowed in consideration of the tenant's making the improvement must be taken into account, and it may now be urged that unexhausted improvements at entry (unpaid for) constitute a benefit, in consideration of which the tenant left an equivalent of unexhausted purchased manures in the soil at quitting. There may, however, be considerable difficulty in connection with this point. Lord Johnston, in the case *The Earl of Galloway* v. *M'Lelland*, 20th July 1915, S.L.R., stated that had the landlord paid compensation for unexhausted manures to the tenant's predecessor, and allowed the benefit of such unexhausted manures to the tenant without charge, very little would have been required to found the implication that such a benefit was allowed in respect of the obligation on the tenant to leave an equivalent value of unexhausted manures to the landlord or incoming tenant on his outgoing.

It may be a question in future whether the amendment above referred to will not make a material difference on the position.

(7) *Substituted Compensation.*

Section 4 of the Act of 1908 (which relates to agreements as to compensation for improvements comprised in Part III. of the First Schedule to that Act) will apply, after 1st January 1921, only to the improvements (market garden improvements) to which Section 29 of the Act of 1908 applies, or are directed by the present Act to apply. This provision is not to affect any agreement entered into before 1st January 1921. Accordingly, any agreement entered into after that date for substituted compensation by table, scale, or otherwise, in any farm lease, shall not be enforceable except with the consent of both parties.

(8) *Deterioration of Holding.*

Where the landlord proves to an arbiter's satisfaction on the termination of the tenancy that the value of the holding has been deteriorated during the tenancy by the failure of the tenant to cultivate the holding according to the rules of good husbandry, or the terms of the contract of tenancy, the arbiter is entitled to award to the landlord such compensation as, in his opinion, represents the deterioration due to such failure, provided always that the landlord has before the termination of the tenancy given notice in writing to the tenant of his intention to claim such compensation. This provision is not to prejudice the landlord from claiming compensation for dilapidations or deterioration of the holding under the contract of tenancy. (But see under procedure regarding the making of claims, &c.)

(9) *Compensation for Disturbance.*

In answer to demands for greater security of tenure, the present Act has increased the compensation for disturbance to an amount greatly in excess of that allowed under Section 10 of the Act of 1908. That section has been repealed (except as after explained), and the corresponding section in the present Act substituted. Accordingly, in place of the provision for paying compensation for disturbance where the landlord terminated a tenancy " without good and sufficient cause, and for reasons inconsistent with good estate management," this compensation must be paid unless the landlord is able to escape liability on one or more of the specific grounds detailed hereafter.

(10) *When Compensation for Disturbance is due.*

Where the tenancy is terminated by notice to quit, given by the landlord after 20th May 1920, compensation for disturbance, on the scale afterwards explained, is payable by the landlord unless the tenant—

(*a*) was at the date of the notice not cultivating the holding according to the rules of good husbandry (as afterwards defined); or

(*b*) had at the date of the notice failed to comply within a reasonable time with any notice in writing by the landlord requiring him to pay any rent due, or remedy any breach, being a breach which was capable of being remedied, of any condition of the tenancy consistent with good husbandry; or

(*c*) had at the date of the notice materially prejudiced the interests of the landlord by committing a breach, which was incapable of being remedied, of any condition of the tenancy consistent with good estate management; or

(*d*) had at the date of the notice become notour bankrupt, or had executed a trust-deed for behoof of his creditors; or

(*e*) refuses, or within a reasonable time fails, to agree to a demand by the landlord in writing for arbitration as to the rent payable as from the next ensuing date at which the tenancy could have been terminated by notice to quit given by the landlord at the date of the said demand; or

(*f*) had at the date of the notice unreasonably refused, or within a reasonable time failed, to comply with a demand in writing by the landlord requiring him to execute at the expense of the landlord an agreement setting forth the existing terms of the contract;

and in the case of notice to quit given after 1st January 1921, unless the notice states that it is given for one or more of the reasons foresaid.

Such compensation, however, is not to be payable where the landlord has given to the tenant an offer in writing to withdraw the notice to quit, and the tenant has unreasonably refused or failed to accept the offer.

This compensation is also payable where the landlord refuses to agree to a request by the tenant for arbitration as to rent, and the tenant in consequence gives notice to quit stating that as the reason, provided that the landlord could not have given notice to quit for one of the reasons (*a*), (*b*), (*c*) above stated.

These provisions take the place of those in the Act of 1908 under which compensation for disturbance was payable where the landlord terminated the tenancy by notice to quit "without good and sufficient cause, and for reasons inconsistent with good estate management." In place of that somewhat ambiguous provision, the present Act specifically states, as above explained, the grounds on which the landlord may escape liability for this compensation.

The landlord is entitled at any time to apply to the Agricultural Committee for a certificate that the tenant is not cultivating the holding according to the rules of good husbandry (as afterwards defined), and the Committee, after giving the parties an opportunity of being heard, may grant or refuse the certificate within a month after the date of the application. Either party may, however, within seven days after notification of the refusal or grant of such certificate, require the question to be referred to an arbiter, who may within twenty-eight days from the date on which the matter is referred to him, grant the certificate or revoke that granted by the Committee. The certificate is conclusive evidence that the holding is not being cultivated according to the rules of good husbandry.

It is not clear that the arbiter would fall to be appointed and act in terms of Section 11 (1) of the Agricultural Holdings (Scotland) Act, 1908, as amended by Section 21 (1) of the present Act.

(11) *Amount of Compensation for Disturbance.*

Subject to the exception already referred to (under "Holdings to which Part II. of the present Act applies"), the compensation payable is a sum representing the loss or expense directly attributable to the quitting of the holding, as may be unavoidably incurred upon, or in connection with, the sale or removal of the tenant's household goods, implements of husbandry, fixtures, farm produce, or farm stock, on, or used in connection with, the holding, including any expense reasonably incurred in the preparation of his claim for compensation (for disturbance), but not the costs of arbitration to determine the claim for compensation; but for the avoidance of disputes, it is provided that such sum shall be computed at the amount of one year's net rent (that is gross rent less (*a*) any public rates, taxes, or assessments which in England are by law a charge on the occupiers of land, or (*b*) any public rates or taxes or other public burdens, the like whereof are not chargeable on lands in England), unless it is proved that the loss and expenses so incurred exceed a year's net rent, when the compensation shall be such sum as represents the whole loss and expenses so incurred up to a maximum equal to two years' net rent.

This compensation is not payable—

(*a*) in respect of the sale of any goods, implements, fixtures, produce, or stock, unless the tenant has before the sale given the landlord a reasonable opportunity of making a valuation thereof; or

(*b*) unless the tenant has, not less than one month before the termination of the tenancy, given notice in writing of his intention to claim; or

(*c*) where the tenant with whom the contract of tenancy was made has died within three months before the date of the notice to quit; or

(*d*) if in a case in which the tenant under Section 23 (now for the first time made applicable to Scotland, subject to slight amendment as afterwards explained under the heading "Resumption of Holdings under Statute") of the Act of 1908 accepts notice to quit part of his holding as notice to quit the entire holding, the part of the holding affected by the notice, together with any other part of the holding affected by any previous notice, given under that section by the landlord to the tenant, is less than one-fourth part of the original holding, or the holding as proposed to be diminished is reasonably capable of being cultivated as a separate holding, except compensation in respect of the part of the holding to which the notice to quit related; or

(*e*) where the holding was let to the tenant by a corporation carrying on a railway, dock, canal, water, or other undertaking, or by a Government Department, or a local authority, and possession of the holding is required for the purpose (not being the use of the land for agriculture) for which it was acquired or appropriated under any statutory provision; or

(*f*) in the case of a permanent pasture which the landlord has been in the habit of letting annually for seasonal grazing, and which has since 4th August 1915 and before 1st January 1921 been let to a tenant for a definite and limited period for cultivation as arable land on the condition that the tenant shall, along with the last or waygoing crop, sow permanent grass seeds; or

(*g*) where a written contract of tenancy has been entered into (whether before or after the commencement of the present Act) for the letting by the landlord to the tenant of a holding, which at the time of the creation of the tenancy had then been for a period of not less than twelve months in the occupation of the landlord, upon the express terms that if the landlord desired to resume that occupation before the expiration of a specified time, not exceeding seven years, the landlord is entitled to give notice to quit without becoming liable in compensation for disturbance, and the landlord desires to resume occupation within the specified period, and such notice to quit has been given accordingly.

Where a tenant has two or more holdings, whether from the same or different landlords, and receives notice to quit one or more, but not all, of the holdings, compensation for disturbance shall be reduced by such amount as is shown to the satisfaction of the arbiter to represent the reduction (if any) of the loss attributable to the notice to quit by reason of the continuance in possession by the tenant of the other holding or holdings.

The landlord who has given notice to quit, if he has not stated the reason for giving the notice, must, within twenty-eight days after a written request by the tenant, state in writing the reason, and if he fails unreasonably to do so, he becomes liable for compensation for disturbance, as if the notice to quit had not been given for one of the allowable reasons already referred to.

(12) *Against Contracting Out.*

Section 5 of the Act of 1908, which declares void any contract or agreement by virtue of which a tenant is deprived of his right to claim compensation for improvements, is extended to embrace compensation for disturbance. Under the heading "Holdings to which Part II. of the present Act applies," &c., there is reference to a case in which contracting out is competent.

(13) *Rules of Good Husbandry.*

It is important to note that "the rules of good husbandry," frequently referred to throughout the present Act, and Part II. of this article, mean (due regard being had to the character of the holding), so far as applicable, having regard to its character and position—

(*a*) the maintenance of the land (whether arable, meadow, or pasture) clean, and in a good state of cultivation and fertility, and in good condition; and

(*b*) the maintenance and clearing of drains, embankments, and ditches; and

(*c*) the maintenance and proper repair of fences, stone walls, gates, and hedges; and

(*d*) the execution of repairs to buildings, being repairs which are necessary for the proper cultivation and working of the land on which they are to be executed; and (*e*) such rules of good husbandry as are generally recognised as applying to holdings of the same character and in the same neighbourhood as the holding in respect of which the expression is to be applied.

The foregoing definition does not, however, imply an obligation on the part of any person to maintain or clear drains, embankments, or ditches, if, and so far as, the execution of the works required is rendered impossible (except at prohibitive or unreasonable expenditure) by reason of subsidence of any land, or the blocking of outfalls which are not under the control of that person, nor in its application to land in the occupation of a tenant does it imply an obligation on the part of the tenant (1) to maintain or clear drains, embankments, or ditches, or to maintain or properly repair fences, stone walls, gates, or hedges, where such work is not required to be done by him under his contract of tenancy; nor (2) to execute repairs to buildings, which are not required to be executed by him under his contract of tenancy.

(14) *Arbitrations as to Rent.*

We have already seen that it is open to landlord or tenant to demand arbitration as to rent, and the consequence of refusal to agree to such demand. It should be noted, however, that such demands can have no effect during the currency of a contract of tenancy, nor are they valid, if made later than six months after 1st January 1921, where any resulting increase or reduction in rent would take effect before the expiration of five years (two years in England) from the commencement of the tenancy or from the date at which a previous increase or reduction took effect.

In determining the question of rent, the arbiter cannot take into account any increase due to improvements executed wholly or partly by, and at the instance of, the tenant without an equivalent benefit given in consideration of their execution, and which have not been executed under an obligation imposed by the contract of tenancy; nor can he fix rent at a higher figure than would have been properly payable if these improvements had not been executed; nor can he fix rent at a lower amount by reason of any dilapidations or deterioration of land or buildings made or permitted by the tenant.

There is no clear direction in the present Act as to how and by whom an arbiter is to be appointed if the parties do not agree upon one, but it is proposed by the Agriculture (Amendment) Act, 1921, that the arbiter shall be appointed and act under the Act of 1908 as amended.

(15) *Record of Holding.*

If the landlord or tenant at any time during the tenancy so requires, a record of the condition of the buildings, fences, gates, roads, drains, ditches, and cultivation of the holding, and, if so required by the tenant, a record of any existing improvements executed by him, or for which he is, under Section 7 of the Act of 1908, entitled to claim compensation, and of any fixtures or buildings which, under Section 20 of that Act, the tenant is entitled to remove, shall be made by a person to be appointed, in default of agreement, by the Board, the cost of making such record being borne by the landlord and tenant in equal shares, unless otherwise agreed.

(16) *Against Removal of Manure, &c.*

Where, after 1st January 1921, notice to terminate the tenancy is given by either party, the tenant shall not, subject to any agreement to the contrary, at any time after the date of notice, sell or remove any manure or compost, or any hay, straw, or roots grown in the last year of the tenancy, unless and until he gives the landlord or incoming tenant a reasonable opportunity of purchasing, on the termination of the tenancy, at their fair market value, or at such other value as is provided by the contract of tenancy.

(17) *Resumption of Holdings under Statute.*

Section 23 of the Agricultural Holdings Act, 1908, hitherto applicable to England alone, is now made applicable to Scotland, and, as amended by the insertion of the italicised words, reads thus—

> " Where a notice to quit is given by the landlord of a " holding to a tenant from year to year with a view to " the use of land for any of the following purposes :—
>
> " (i) The erection of farm labourers' cottages or other houses, with or without gardens ;
>
> " (ii) The provision of gardens for farm labourers' cottages or other houses ;
>
> " (iii) The provision of allotments ;
>
> " (iv) The provision of small holdings under the *Small Landholders (Scotland) Acts*, 1886 *to* 1907 ;
>
> " (v) The planting of trees ;
>
> " (vi) The opening or working of any coal, ironstone, limestone, brick earth, or other mineral, or of a stone quarry, clay, sand, or gravel pit, or the construction of any works or buildings to be used in connection therewith ;
>
> " (vii) The making of a watercourse or reservoir ;

"(viii) The making of any road, railway, tram-road, siding, canal, or basin, or any wharf, pier, or other work connected therewith;

"and the notice states that it is given with a view to "any such use—

"(*a*) it shall, by virtue of this Act, be no objection to the notice that it relates to part only of the holding; and

"(*b*) the provisions of this Act respecting compensation shall apply as if the part to which the notice relates were a separate holding; and

"(*c*) the tenant shall be entitled to a reduction of rent proportionate to the part to which the notice relates, and in respect of any depreciation of the value to him of the residue of the holding caused by the severance, or by the use to be made of the part severed, and the amount of that reduction shall be settled as in case of compensation under this Act."

It is, however, provided that the tenant may, at any time within twenty-eight days after service of the notice to quit, serve on the landlord a notice in writing to the effect that he accepts it as a notice to quit the entire holding, to take effect at the expiration of the then current year of tenancy; and the notice to quit shall have effect accordingly.

(18) *Resumption of Part of Holding under Contract.*

Where, after 1st January 1921, the landlord gives notice in accordance with a provision in the contract of tenancy of his intention to resume possession of some part of a holding, the provisions of paragraphs (*b*) and (*c*) above quoted of Section 23 of the Agricultural Holdings Act of 1908 (but not including the proviso) are to apply as if the notice were a notice to quit, as is mentioned in that section. In assessing the compensation to the tenant or reduction of rent, the arbiter is required to take into account any benefit or relief allowed to the tenant under the contract of tenancy in respect of the land resumed.

(19) *Notice of Termination of Tenancy.*

Section 18 of the Act of 1908, which regulates the statutory notice to terminate tenancies, is to remain in force as regards leases entered into prior to the passing of the present Act, but as regards leases entered into after the passing of the present Act, Sub-Section (1) of that section is to read as follows:—

(*a*) In the case of leases for two years (formerly three years) and upwards, not less than two years before the termination of the leases;

> "(b) In the case of leases from year to year, or for any other period less than two years, not less than six months before the termination of the lease;"

and Sub-Section (2) is to read as follows:—

> "Failing such notice by either party, the lease shall be "held to be renewed by tacit relocation for another "year, and thereafter from year to year, and in the case "of any lease so renewed, the period of notice required "to terminate the tenancy shall, where the notice is "given after 31st May 1921, be not less than one year "nor more than two years."

It seems a peculiar condition which only requires not less than six months' notice in the case of new leases from year to year or for any other period less than two years, while not less than one year and not more than two years' notice is required in the case of leases renewed by tacit relocation.

There is also a direction that the provisions of the Sheriff Court (Scotland) Act, 1907, relating to removings, shall, in the case of any holding to which Section 18 of the Act of 1908 applies, have effect subject to the provisions of that section as above modified.

(20) *Procedure regarding the Making of Claims, &c.*

Sub-Sections (2) and (3) of Section 6 of the Act of 1908 are repealed. Shortly, these sub-sections required claims for compensation for improvements to be made before the determination of the tenancy, and authorised counter or additional claims by either landlord or tenant to be brought into an arbitration within seven days after the appointment of an arbiter. In substitution for these sub-sections, the present Act provides in Section 18 that—

(1) any question or difference arising out of any claim by the tenant against the landlord for compensation under the Act of 1908, or for any sums claimed to be due to the tenant from the landlord for any breach of contract or otherwise in respect of the holding, or out of any claim by the landlord against the tenant for waste wrongfully committed or permitted by the tenant, or for any breach of contract or otherwise in respect of the holding, and any other question or difference of any kind whatsoever between landlord and tenant arising out of the termination of the tenancy of the holding, or arising, whether during the tenancy or on its termination, as to the construction of the contract of tenancy, shall be determined by arbitration under the Act of 1908; and

(2) any such claim is to cease to be enforceable after the expiration of two months from the termination of the tenancy, unless particulars thereof have been given by either party to the other before the expiration of that period, provided that where a tenant lawfully remains in occupation of part of a holding after the termination of the tenancy, particulars of a claim relating to that part may be given within two months from the termination of the occupation.

Doubtless there will arise the question whether these provisions have the effect of excluding the jurisdiction of the ordinary Courts of Law. It would almost appear as if that was intended, subject always, of course, to a right to have a case stated for the opinion of the Court on any question of law.

These provisions are not to apply in the case of a tenancy which terminated before 1st January 1921, nor, it is thought, with reference to the grass parks, gardens, or pleasure ground, &c., referred to under "Holdings to which Part II. of the present Act applies." In such cases it appears to be necessary to fall back on the provisions of Section 10 of the Act of 1908 (as unamended).

(21) *Panel of Arbiters.*

The present Act makes provision whereby the Lord President of the Court of Session is required to form a panel of persons from whom any arbiter nominated otherwise than by agreement for the purposes of an arbitration under the Act of 1908, shall be selected by the Board of Agriculture for Scotland. The remuneration of such an arbiter is to be such sum as is fixed by the Board of Agriculture, the remuneration of an arbiter appointed by the parties being, in default of agreement between these parties and the arbiter, such amount as, on the application of the arbiter or either of the parties, may be fixed by the auditor of the Sheriff Court.

(22) *Awards in Arbitration.*

The provision in the Second Schedule to the Act of 1908, which requires that an award shall fix a date for payment of the amount awarded not sooner than one month nor later than two months after the delivery of the award, is altered by the substitution of "not later than one month" for "not sooner than one month nor later than two months," and the arbiter is bound to—

(*a*) state separately in his award the amounts awarded in respect of the several claims referred to him; and

(*b*) may, if he thinks fit, make an interim award for the payment of any sum on account of the sum to be finally awarded.

(23) *Disturbance and Allotments.*

The provisions of the Act as to compensation for disturbance apply, with the necessary modifications, to allotments under the Allotments (Scotland) Act, 1892, as amended, or applied by any subsequent enactment, except allotments provided by a local authority under that Act.

Where the tenancy of an allotment is terminated by notice to quit, which is less than one year's notice, the compensation shall be—

(1) Either such amount as is payable under the provisions applicable to farms (with the necessary modifications), or

(2) Such amount as represents the benefits which would have accrued to the occupier from the occupation on the terms of the expired tenancy during the period between the date of the expiration of the tenancy and the end of one year from the date on which the notice to quit was given, whichever is the greater. No compensation is to be payable where the land is reasonably required for naval, military, or air-force purposes, or for buildings, mining, or other industrial purposes, or for roads necessary in connection with any of those purposes, nor where at least a year's notice to quit is given.

The question whether compensation is payable in respect of an allotment, or as to the amount, falls to be determined in accordance with the provisions of the Allotments (Scotland) Act, 1892, in the same manner as the amount of compensation for crops, or other matters, is determined under that Act.

(24) *Disturbance—Cottages on Holdings.*

Where the occupancy of a cottage, forming part of an agricultural holding, has been allowed to a workman employed by the tenant in agriculture on the holding (whether the occupancy is under a contract of tenancy or not), and the occupation of the cottage is terminated on account of the termination by the tenant of the holding of the employment of the workman, compensation for disturbance is payable to the workman in the same way as in the case of an agricultural tenant.

For the purpose of this compensation, the year's rent of the dwelling-house is to be taken to be a sum equal to fifty-two times the maximum weekly value (not exceeding in any case 3s.) of the benefit of the provision of a cottage free from rent and rates as determined for the District Agricultural Wages Committee.

This compensation is not payable, if—

(*a*) the notice to terminate the occupation is given before the expiration of six weeks from the commencement of the occupation; or

(*b*) the tenant of the holding has, before giving the notice, obtained from the District Wages Committee, or a duly authorised sub-committee, a certificate that the termination of the occupation is necessary or expedient to enable the holding to be worked properly, or to better advantage (where such a certificate is applied for, the workman is entitled to appear before the Committee or Sub-Committee, and in the event of a certificate being refused, he may recover from the tenant such sum as the Committee or Sub-Committee may direct in respect of expenses incurred in appearing); or

(*c*) the employment of the workman is for a year or half a year, and the occupation is terminated at the end of that period; or

(*d*) the workman does not cease to occupy the house on the expiration of the notice to terminate his occupation thereof, or on the expiration of a period of two months from the date when the notice was given, whichever is later; or

(*e*) the notice is given by reason of the employment of the workman having been terminated for misconduct, such reason being substituted for the reasons above specified with reference to an agritural holding.

The question as to whether compensation is payable, or as to the amount thereof, falls to be determined by the District Wages Committee, or a duly authorised Sub-Committee thereof, the Committee or Sub-Committee to have power to direct payment by the tenant to the workman of a sum in name of expenses in respect of his appearing before them. Under Section 12 (4) of the present Act, which makes provision for this compensation, it is stated that such sum "shall be recoverable by the tenant as a civil debt." This should obviously be "by the *workman*." This is being put right by the Agriculture (Amendment) Act, 1921.

(25) *Dwelling-houses occupied by Workmen.*

There is provision to the effect that, notwithstanding any agreement to the contrary, under any contract of employment of a workman employed in agriculture made after the commencement of the present Act, where the provision of a dwelling-house or part of a dwelling-house for the occupation of the workman forms part of the remuneration of the workman, and the provisions of Sections 14 and 15 of the Housing, Town Planning, &c., Act, 1909, are inapplicable by reason only of the house or part not being let to the workman, there shall be implied as part of the contract of employment and as from the commencement of the occupation or of the present Act, whichever date is the later, the like conditions as would be applied under those provisions if the house or part were so let, and these provisions are to apply accordingly with the substitution of employer for landlord, and such other modifications as may be necessary. This is, however, subject to the proviso that it is not to affect the obligation of any person other than the employer to repair such a cottage, or any remedy for enforcing any such obligation.

III.—AMENDMENT OF THE AGRICULTURAL LAND SALES (RESTRICTION OF NOTICE TO QUIT) ACT, 1909.

The leading clause of this Act is amended to read thus (the italicised words in the body of the clause being inserted) :—

> 1. *Restriction of Notices to Quit.*—" On the making, " after the passing of this Act, of any contract for sale " of a holding, or any part of a holding held by a tenant " from year to year, any then current and unexpired " notice to determine the tenancy of the holding given " to the tenant, either before or after the passing of this " Act shall, *if the contract for sale is made by the person* " *by whom the notice to quit is given*, be null and void, " unless the tenant shall, after the passing of this Act " (19th August 1919), and prior to such contract of sale, " agree that such notice shall be valid."

FARM FORESTRY.

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THE title of this article will very likely be new to many readers, and they may ask what is the connection between farming and forestry. In the following pages some attempt will be made to answer this question.

Forestry or sylviculture is usually looked upon as an industry which can only be properly carried on where large blocks of woodland exist, and as requiring a specialised and highly skilled class of labour. Moreover, the crops grown require, even under the most favourable circumstances, long periods of years to reach marketable size, as compared with the sowing and reaping of agricultural crops within a few months.

All this is perfectly true where forestry is practised as a considerable or principal industry in itself; but that is not the aspect of the question under immediate consideration, and it is desired to lay stress on the value and importance of the growth of timber, even on quite a small scale, as a subsidiary branch of the economy of the farm.

During the past two or three years there has been a widespread change in the ownership of land in Scotland. Occupying ownership of farms has increased to a remarkable extent, due to the breaking up of large and medium-sized estates and the purchase of farms by sitting tenants. Fortunately, owing to the recent period of prosperity enjoyed by agriculture, farmers have been better able to purchase their farms than would have been thought possible five or six years ago. They have found, however, that as occupying owners they have certain problems to face which are new, and sometimes difficult and perplexing. Life-long training and experience has taught them how best to handle land and stock so as to ensure the maximum production. The problem of dealing to the best advantage with timber and woodlands on the farm is of a different nature. So long as the farm was a part of a larger estate with a forestry staff, the woods were dealt with by the owner, and such measure of attention as the timber crops needed was provided in this way. When the timber was considered ripe for felling, it was removed by the owner and the ground replanted. The plantations upon the farm thus formed part of a separate unit of management, and were excluded from the agricultural let.

With the sale of separate farms came the necessity of including the woodlands upon the farm, and it is in this way that "Farm Forestry" has arisen.

It is unfortunate that in too many instances the new owner has forthwith sold the whole of the timber on the farm, in order to realise some part of the purchase price, and in such instances there is not much likelihood of any replanting being done. In other cases the woodlands remain, and the new owner is anxious to make the best of them, but is in some doubt as to the system of management he should pursue.

It is desirable, in the first place, to consider from the point of view of the occupying owner the relative advantages and disadvantages of plantations in the form of strips, belts, or larger blocks, situated on agricultural land.

The advantages may be summarised as under:—

(1) Shelter from winter storms and high winds.

(2) Earlier growth of pasture in spring in the vicinity of woods, due to shelter.

(3) A convenient and regular supply of fencing material, firewood, and timber in various forms for the maintenance of fences and buildings, without the necessity of purchasing the same at high prices in the open market, and the avoidance of haulage for considerable distances of a bulky article.

The disadvantages may be summarised as follows:—

(1) On arable land the shade or shelter of trees and woodlands may retard the ripening of the corn crop, and may render the corn when cut slower to win.

(2) The spreading of tree roots into arable land may cause trouble and delay in ploughing, and may obstruct tile or stone drains.

(3) Plantations may harbour weeds, especially when the ground has been recently felled or newly replanted, and the weed seeds may be carried on to adjoining land under crop. The proximity of woodlands sometimes gives shelter to obnoxious flies and insects, which may be troublesome to stock. The harbouring of birds is sometimes spoken of as another disadvantage of woodlands in agriculture. While, however, some birds may be destructive through grain-eating and in other ways, many other birds living in woods are of great value to agriculture, and may be fairly considered as at least neutralising any possible harm done by other species.

(4) The existence of plantations, especially in the form of strips or belts, usually implies the upkeep of a greater length of fencing than would otherwise be the case.

After striking a balance, however, most farmers will admit that a certain area of plantations is a useful adjunct to any farm, more particularly on high-lying exposed situations at a long distance from rail.

A brief consideration of these advantages and disadvantages may not be out of place.

Advantages.—Shelter from winter storms and high winds. The value of shelter strips, even on farms at comparatively low elevation, is particularly evident where the land is flat and wind-swept. Even on hilly ground, however, the shelter of plantations is valuable. The months of March and April are often the most trying for stock, and in periods of cold north and east winds both sheep and cattle are generally found taking advantage of what shelter they can get under the lee of a wood. It seems probable that many of the shelter strips and belts planted a hundred years ago were specially laid out to afford the maximum of shelter. Such woods were often formed at opposite sides of a field, or in the shape of an "L" or "T" at the corner of two or more fields. The star-shaped plantation will be familiar to sheep-farmers, and although many of these plantations have now disappeared, the remains of the enclosing fences are frequently visible. The design of the star-shaped plantation was to provide shelter for sheep in a snowstorm from any quarter, and while such plantations were young or middle-aged, they no doubt fulfilled the purpose admirably. Unfortunately many such plantations when finally felled were not replaced, and hill farms are the poorer in consequence.

The earlier growth of grass in the vicinity of plantations is generally most noticeable in April and May. It is most marked, as a rule, when the shelter is on the north and east sides, and the pasture is thereby protected from the winds in that quarter, which are often prevalent in those months, and which tend so greatly to delay the much-wanted early grass. The extent of land affected varies considerably with the height of the trees and the slope of the ground, but the added greenness of the turf is often noticeable for a distance equal to four or five times the height of the trees. Where the shelter strip is of considerable length, the area affected may extend to several acres and form a fair proportion of the field.

The planting of shelter strips and belts is particularly noticeable in the counties of Berwick and Roxburgh, most of these plantations having apparently been made in the early part of the nineteenth century. The best lines to attain the object in view have evidently been studied with considerable care; and although many of these woods are now long past their prime and have become thin and bare, their usefulness still continues.

Disadvantages.—The drawbacks of arable fields surrounded by woods are well known. Not only is the ripening of the corn crop uneven, but in wet catchy seasons much additional labour is involved in winning the corn within thirty or forty yards of the wood, especially where the trees lie to the south and obscure the sun. It is only in exceptional cases, however, that fields are entirely surrounded by woods, and such plantations have most likely not been made for the purpose of shelter for the agricultural land. Even in such extreme cases it is likely that the advantages derived from shelter while the field is in grass practically outweigh the disadvantages of the years when the field is in crop.

Tree roots extending into fields are sometimes extremely troublesome when the land has been unploughed for a considerable number of years. In land that is under regular rotation, however, roots do not cause much trouble, for the reason that they have not time to attain any great size, and are constantly being cut and broken up to the full ploughing depth. Main drains will always require attention where they pass into or near a wood. Choking from the intrusion of roots from time to time is almost unavoidable in such situations. After discharging into the plantation, the outfall should be a clear one into a ditch or open drain as soon as the fence is reached.

The growth and propagation of weeds within and upon the margin of plantations is undoubtedly prejudicial and a source of additional trouble and expense, more especially to the arable farmer. This nuisance has been particularly in evidence during the last year or two from the wholesale felling of shelter strips as well as large woods, and the subsequent growth of weeds, the seed from which is carried far and wide over adjoining fields. Unfortunately there seems little prospect of many of these areas being replanted, and in such cases the ground will remain practically waste until eventually it may grow up a mass of worthless scrub, or at best become a poor and inferior pasture. In certain cases farmers may be only too conscious of such conditions, and yet be quite unable to remedy them owing to the plantations being situated upon property belonging to another owner. Much might, however, be done by dealing carefully with the growth of such weeds in plantations which are situated on the farm. Where the ground is not yet replanted, weeds can be cut or burned before they reach the seeding stage, and in newly-planted young woods the cleaning should be similarly undertaken at the proper time, not only to prevent the weeds seeding, but for the sake of the young timber crop.

In old woods with thin canopy noxious weeds may sometimes get a footing and flourish. If the wood is not to be felled for some considerable time, such weed growth can be sometimes stopped by underplanting with beech or some other shade-bearing species. Otherwise the only remedy is to cut the weeds before seeding. In most plantations weeds may flourish on the margins inside the fences, and in such situations they must be cut just as along the farm fences. Thistles are the most common and harmful weed spread from plantations, but many others also exist. The well-stocked wood of any age is the best protection against growth of weeds.

Farm Forestry is divisible into two parts so far as most new owners are concerned—viz., (1) the maintenance of existing woodlands; and (2) the formation of new plantations.

The Maintenance of Existing Woodlands.—It is a matter for consideration whether the whole of the existing woodlands upon a farm are worth retaining. Narrow strips or points may involve a good deal of fencing without any corresponding advantage in shelter, and such places are best excluded from the fenced woodlands as opportunity offers when fences are being repaired or renewed. As a rule, however, such plantations have been laid out for shelter or with some definite object in view, and are best retained.

The main theory of the management of large areas of forest is a continuous annual production of timber and a continuous succession of age classes—that is, in a forest of 4000 acres with a rotation of eighty years, the annual fellings should average fifty acres, and the growing crops should represent eighty graduations of age from one to eighty years. While this principle of management cannot be strictly applied to small areas of woodlands, it is nevertheless desirable to keep it steadily in view. Even in the case of quite small areas, such as ten acres of mature or nearly mature timber, the felling and replanting of one acre every two or three years will soon render the woodlands much more valuable to the farm than they would otherwise be; while the produce of the one acre felled, so far as it is unsuitable for use on the farm, can probably be sold without much difficulty, more particularly if the owner is in a position to cart the timber for the purchaser either to the railway or sawmill. Blown trees, as well as dead or dying trees, and stems broken by wind, should be removed as soon as practicable. Such timber is always useful, if only fit for firewood, and the neglect to attend to the removal of such material has been a serious blot on the forestry of this country in the past, as well as an enormous source of waste. Dead and dying coniferous trees are also the breeding-ground of several insects injurious to growing crops of timber.

The Formation of New Plantations.—On some farms there are no plantations, or such a very small acreage as to make it desirable to increase the area under wood. On rich purely arable farms it may well be the case that land is all too valuable to plant with trees, and that there are no waste corners. On most upland and hill farms, however, there must inevitably occur pieces of ground which are of little value for grazing or cultivation, and which in some cases it is an actual advantage to exclude stock from. Dangerous banks and scaurs, narrow steep glens, ground containing wet hollows liable to flooding and likely to produce liver-rot in sheep, occur on most farms of the type just referred to. Such ground is, as a rule, quite suitable for planting with trees, and is worth far more for that purpose than for any other. The cost of fencing at present prices must be a serious consideration; but this may easily be compensated by the greater protection of stock from accident or disease and the eventual advantage from shelter obtained.

The main principles underlying the formation, tending, and realisation of timber crops are the same for large areas of woodlands as for Farm Forestry. A few notes on these matters may be of service to those who have not hitherto had an opportunity of studying these questions.

Enclosure and Fencing.—Where woodlands already exist, the fencing has merely to be maintained or sometimes renewed. Stone dykes are one of the best types of fence for plantations, and where dykes exist they are well worth maintaining. The cost of new stone dykes is now so high that few people would care to undertake their erection unless in short lengths or for special reasons. Hedges and wire fences are both quite suitable for plantation enclosures; but hedges, unless receiving regular attention, do not often form an adequate fence, and usually require making up with wire or paling. It is sometimes difficult, even with the greatest care, to maintain a hedge in good condition on the north side of a plantation where the hedge is shaded and overhung by trees. Wood paling also makes a good fence, but is expensive, unless the timber can be sawn on the farm and thus save carting and the cost of wire. If it is necessary to use wire-netting when replanting a cleared area or in planting new ground, the cost of fencing is enormously increased. It is, perhaps, scarcely necessary to say that the rabbit is as great an enemy to forestry as it is to agriculture. Where rabbits exist in large numbers it is difficult to exclude them, even with the use of wire-netting, and economic forestry, whether on the farm or on a larger scale, becomes virtually impossible. There are instances where the use of wire-netting is inevitable, especially where plantations are situated upon or near boundaries with other properties where rabbits are not killed down. Where wire-netting is erected, it is essential to inspect it regularly in order to make sure that no holes have been made; and in snow, when drifts may have enabled rabbits to go over the wire, special vigilance is required.

Draining.—On some land draining is necessary before successful planting can be attempted; but, as a general rule, the less draining the better, consistent with putting the ground into a suitable condition to plant. The type of drain cut is the same as the open drain made on hill ground for improving pasture for sheep or cattle. The material taken from the drains, if heaped in a ridge or in small mounds, forms useful planting ground for the young trees. Certain species of tree can stand a good deal of moisture, but few can survive or make any satisfactory growth in soil which is water-logged to the surface, and is thus in a sour condition without the possibility of air penetrating.

Species of Plants.—The species of trees most suited to Farm Forestry requires careful consideration. The problem is different in several ways from the selection of species for establishing timber crops upon a large scale. The occupying owner of a farm does not, as a rule, require much hardwood timber, nor does he need timber of specially large dimensions. Hardwoods, or broad-leaved species, may therefore be ruled out to a great extent, partly for the reason that they are slower in maturing, partly because they are more difficult to establish and to manage as a young crop, and also because the growth of heavy hardwood timber of high quality is unsuited to small areas. If it is desired to grow a few hardwoods, the most suitable species will probably be found in oak or ash, with an admixture of beech and 50 per cent of Common larch for the purpose of drawing away the hardwood leaders, the larch to be planted pure in alternate rows to the hardwoods. An exception as regards broad-leaved species may be made with regard to the Grey alder (*Alnus incana*) and certain of the poplars. These species are peculiarly suitable for planting on moist, fresh, or even on wet land such as scaurs, which discharge water from the ends or edges of the projecting strata, or banks where land-slips have occurred. The Black Italian poplar, *Populus trichocarpa*, an American species, and some of the newer hybrids, are quite suitable for this purpose, and are very rapid in growth. There is some difference of opinion as to the best method of growing poplars; but it is probable the most satisfactory results are likely to be obtained by planting them fairly wide apart—say 15 feet or 20 feet—among other species such as spruce, letting the poplars get ahead, as they demand a large amount of light and room for the successful development of the stem. Among coniferous species there is a considerable choice for Farm Forestry. What seems likely to be required for the farm is timber of moderate dimensions, suitable for conversion into fencing material or posts and roof timbers. Quick-growing species will be preferable to trees of slower growth. Among the most rapid growing of the non-indigenous conifers of commercial value, the first place must be given to Japanese larch, Douglas fir, and Menzies or Sitka spruce. The Common or European larch, although not a native tree, has been grown in this country for two centuries, and its characteristics and habits are quite well known. In certain districts the growth of the Common larch is about as rapid as the Japanese larch, but, as a rule, the Japanese quite outgrows the European species. The Scots pine, which is indigenous to Great Britain, produces timber of great value for constructional work, especially when of large size, but its growth is slow compared with that of the other species mentioned. The Common spruce and the Silver fir are also trees of some value, but both are comparatively slow in growth in their early stages, and for that reason are likely to be of less value in Farm Forestry than in sylviculture practised on a large scale. The only other coniferous trees which may be briefly mentioned are the Corsican and Austrian pines, both of which, especially the Corsican pine, have been found to do well in certain coastal districts, where exposed to high winds and salt spray. The growth is rather quicker than with Scots pine, and the timber is somewhat coarser.

The selection of the right species of tree to plant in any given situation is of vital importance. An agricultural crop grown on unfavourable or unsuitable soil may prove a failure, but beyond the loss attending that particular season no consequent ill results need follow. A mistake made in the selection of the species of a timber crop, however, may not be immediately apparent, and it is only after some years that the error becomes obvious. Not only is the whole initial cost of the original planting and tending thrown away, but valuable time has been lost, and the whole ground may have to be replanted with another species of tree.

Generally speaking, the five species which are likely to be the most valuable in Farm Forestry are—Japanese larch, Sitka spruce, Douglas fir, Common larch, and Common spruce, in the order named.

Japanese larch is fairly accommodating, but it does not, as a rule, thrive on peaty or very dry soils, nor does it stand well exposure to high winds. The best results with Japanese larch are probably attained in districts with a rainfall of at least 35 inches, although in certain localities the growth is extremely good with an annual rainfall of no more than 26 inches. A very dry summer within a year or two of planting may cause the loss of a considerable number of plants. The species is not so frost-hardy as the European larch.

Under the most favourable circumstances of soil, situation, and climate, such as a sloping bank at moderate elevation, with a moist well-drained soil of fair loam, and a rainfall of 40 inches or more, the growth of Japanese larch is phenomenal, and may reach an average of 180 or 200 cubic feet per acre per annum over the first fifteen or twenty years.

For ordinary farm purposes, more particularly for fencing and net stakes, a good crop of Japanese larch would be of serviceable size in twelve to fifteen years, and a clear cutting might possibly be made in twenty years.

The Sitka spruce is a more accommodating tree than the Japanese larch. It withstands wind well, and is rarely broken by snow. The growth is extremely vigorous and rapid after the first two or three years, although scarcely equal to the Japanese larch or Douglas fir. The tree prefers a considerable rainfall, but also thrives well in a dry climate. Sitka spruce grows quite well on moory, rather poor soils—in fact, anywhere that the Common spruce will grow, the Sitka spruce is likely to succeed better. The plant is, however, delicate as a seedling, and very liable to injury from frost even after it is planted out. For this reason Sitka spruce should not be used in frost holes or damp hollows, and the Common spruce is more likely to succeed in such situations. The tree has not been grown in this country under forest conditions on a sufficient scale to warrant a final opinion upon its merits; but from the size and quality of the timber in the forests of British Columbia and the growth of specimen trees in Great Britain, there seems little doubt that this species, owing to its adaptability and apparent freedom from disease, is one of the most valuable introductions among foreign conifers which has yet been made. The so-called "Silver spruce," which was greatly in demand for aeroplane-building towards the end of the war, was sawn from selected logs of Sitka spruce.

For rapidity of growth on good soil the Douglas fir is unequalled, but its use as a species for planting is limited in several ways. A good soil is essential, and while Douglas fir will stand a good deal of moisture if the soil is fresh and well aerated, it is extremely sensitive to sourness or stagnant water. Small patches in a plantation will often die off from these causes, which were not suspected at the time of planting. From ten to twenty years of age Douglas fir is liable to snow damage, and the soft, rather brittle growth of the leaders and branches may be seriously damaged by a fall of wet snow. Douglas fir does not stand exposure to wind well, and requires a sheltered situation for the best results. It is also somewhat frost-tender owing to the habit of making a second growth in the autumn. For these reasons Douglas fir should only be planted where there is a reasonable prospect of its success. It is quite unsuited to poor moory soils with considerable exposure. Where the tree can be successfully grown it is equal to, if it does not exceed the Japanese larch in the rapid production of timber.

The value of the timber of the Common larch is well known, and the lasting properties, as compared with the spruce or even Scots pine, are frequently demonstrated by the examination of the material in an old post-and-wire fence. Larch grows well in both wet and dry climates; it is not exacting as regards soil, and will stand more exposure than the Japanese variety. Unfortunately, however, the larch disease—a fungus parasite on the stem and branches—is now so widespread and fatal as to render it useless in certain places to plant any larch at all.

The Scots pine, Common spruce, and Silver fir are all useful species, and as their value has been proved by generations of experience, they are not to be lightly discarded. At the same time, it must be recognised that the much more rapid growth of the species already described make them more desirable for use in Farm Forestry than the slower-growing older species.

Any one in doubt as to the best species to plant is recommended to apply for advice either to a local forester of standing, or to the Divisional Advisory Officer of the Forestry Commission.

Plants and Planting.—The size of plants for putting out into plantations is a matter of some importance. Frequently the plants used are too large, under the mistaken impression that they will soon make a crop. Within limits, however, it may be said that the smaller the plants used the quicker and the more satisfactory the results.

The usual rule is to employ what are known as two-year two-year plants for planting out—that is, trees which are four years old from seed, and have been two years in the seedbeds and two years in the nursery lines. For Japanese larch and Douglas fir, however, these plants are often too big, and better results may be got with three-year-old plants. Where the growth of herbage or bracken is not very rank and coarse, moderate-sized plants can be safely used. It is not suggested that in Farm Forestry operations any attempt should be made to grow the plants required from seed. Some owners may prefer to purchase two-year seedlings from the nurserymen, and line them out in a corner of the garden for either one or two years. Good well-rooted plants may be secured in this way, and the only labour involved after lining out is to keep the soil stirred and absolutely free from weeds between the lines. In the great majority of cases, however, the plants will be obtained from nurserymen who specialise in this trade. Forest transplants have for the past two years been extremely scarce and high in price; but with the large quantities of seed sown in 1919 and 1920, it is anticipated that plants will by another season be fairly plentiful and obtainable at much more moderate prices. It is unlikely that the pre-war prices of 20s. to 30s. per 1000 for transplants can return; but there seems no reason why a rate of 40s. per 1000 should not be reached, and still leave a reasonable profit to the grower.

The best distance for planting is a matter which has recently excited a good deal of discussion, the high cost of labour and plants making economy in the number of plants used the more imperative. While there is some danger of going to extremes in wide planting, there is a fair consensus of opinion among foresters that for the newer coniferous species—Japanese larch, Douglas fir, and Sitka spruce—5 feet 6 inches to 6 feet apart is not too wide, provided that every vacancy is filled until the young crop is established. For Common spruce and Scots pine a rather less distance is necessary—4 feet 6 inches to 5 feet. The saving in cost by planting at 6 feet instead of, say, 4 feet is enormous, 1210 plants per acre being required for the former, and 2700 per acre for the latter. If plants are taken as costing 50s. per 1000, and the labour of planting at 12s. per 1000, the cost for these two items will vary from £3, 15s. per acre for 6-feet planting to £8, 7s. 6d. per acre for 4-feet planting.

The method of planting usually employed for conifers is by notching, or the use of the circular spade. The latter method is rather more costly, but its use is spreading. Notching, if carefully done, is, however, quite effective. Pitting is very costly, and is rarely resorted to unless in the case of hardwoods.

The care of the young plantation for the first few years is almost as important as the planting. It is essential to cut all rough weeds, grass, and bracken before these attain such a size as to smother the young plants. Where brackens are strong, two cuttings in one season are often necessary. Brambles, wild raspberry, whin, broom, and birch are often troublesome weeds, and may entirely suppress a crop of young trees if not kept in check. All dead trees should be replaced each season until the crop is fully established without any gaps.

The cost per acre of establishing a young crop is so variable that it is difficult to give even average figures. Assuming the planting distance to be 6 feet, and allowing 25s. per acre for cleaning and beating up blanks, the cost per acre would amount to £5, but to this falls to be added the outlay upon drainage if required and the cost of fencing. The latter item may be nominal if the plantation is already fenced, or may at current rates of 2s. to 2s. 3d. per yard amount to far more than the cost of planting if the area enclosed is small or in the form of a narrow strip. If, in addition to the fencing, wire-netting is necessary, a further very large outlay may be involved.

While planting work and the cleaning of young plantations needs to be carefully done, it is quite within the competence of a farm staff to do the work once they have been shown what is required. In this way planting work might be economically done on a farm in winter when other work was not pressing. In some cases the owner may be deterred from undertaking any forestry operations on his farm, not so much on the ground of cost, as through fear of undertaking any such scheme without skilled advice. This difficulty can, however, quite well be met by application to the District Advisory Officer already referred to, or by becoming a member of a Forestry Co-operative Society which specialises in work of this nature.

On farms situated at some distance from a sawmill, the difficulty of having timber in the log converted into fencing material or boards may be considerable, and the double cartage must in any event prove costly. Portable sawmills can be hired in some districts for a few days' sawing, but if the distance is considerable the charges must be high. Hand-sawing, except for cross-cutting, is too slow and laborious. Split fencing-stakes are sometimes used, but they are of less value than sawn stakes, and there is a good deal of waste, however carefully the splitting is done. A great many farms now have oil-engines for driving the threshing-mill, corn-bruiser, or other machinery. In other cases fairly good water-power exists for the same purpose. Where such power exists there is not much difficulty in fitting up a saw bench suited to the horse-power available, and capable of converting moderate-sized logs into fencing and construction timber. Small iron benches with a 30-inch saw can be purchased at from £20 to £25, and if it is desired to lengthen the bench for sawing rails, this can be done by a local joiner. Water-power, where available, is the most suitable for driving a saw, and is steadier than an oil-engine. Oil- or petrol-engines require to be used carefully for sawing, unless there is an ample margin of power, and the sudden application of a log to the saw may stop the engine altogether. Six horse-power is about the smallest power which can be used with advantage with an oil- or petrol-engine, although a rather less horse-power derived from water will be equally serviceable. A small saw bench of this type is also extremely useful for cutting firewood, and at the present high price of coal, the value of firewood is coming to be more appreciated than formerly.

Farm Forestry has received much attention in the United States of America for some years past, the common tenure of agricultural land being that of the occupying owner. Both the Departments of Forestry and of Agriculture have issued bulletins and leaflets on the subject, giving advice to farmers as to the management of their "woodlots," and the importance of making the most of these areas of woodlands on the farm not only in the interest of the individual, but also in the interest of the State. In a recent number of 'American Forestry' (October 1920), a journal having a wide circulation, and devoted to the furtherance of afforestation and sylviculture, the following paragraph appears :—

> "*Forestry increases the farm income by—*
>
> 1. Making waste lands yield a profit by growing timber on poor soils, steep slopes, rocky lands, wet lands, unused corners, gullied or eroded lands.
> 2. Furnishing paying employment for men and teams during the winter.
> 3. Utilising timber better on the farm, and avoiding waste by cutting low stems and small tops, using substitute woods in construction, and treating non-lasting woods.
> 4. Increasing crop yields by planting forest-tree windbreaks.
> 5. Growing more and better timber on the farm through protecting the woods, . . . selecting for cutting the mature, defective, over-crowded, and inferior kinds of trees, and leaving the straight, thrifty, and better kinds; planting to fill up openings in the woodlands.
> 6. Marketing the higher grades of wood products direct to consumers at fair prices in the form of saw-logs, poles, &c.
>
> Make your woodlands permanently profitable."

Conditions in the United States may not be identical with those in Scotland, but there is enough similarity to make this advice well worthy of attention. The transference of the ownership of land from large estates, where the landlord and tenant system has prevailed over a long period, to the ownership of the farm by the occupier, is now an accomplished fact in many counties, and it is quite likely that the process may go further yet. This change of ownership has brought the problem of Farm Forestry prominently to the front. It is clearly in the interest of the State, as much as in the interest of the individual owner, that plantations, where such exist or might with advantage exist, as part of the farm economy, should be managed to the best possible advantage on a regular and definite system, just as with agricultural crops, so that the maximum of production may be attained.

In conclusion, reference may again be made to the danger of weed propagation from neglected woodlands. From the agricultural point of view, it is necessary to emphasise the serious loss and injury which may be occasioned from this cause, and the duty which lies upon all woodland owners, large or small, to protect both their own lands and those of their neighbours from the invasion of thistles and other noxious weeds.

THE MEASUREMENT OF SOIL DRAINAGE:

WITH AN ACCOUNT OF THE CRAIBSTONE DRAIN GAUGES.

By Professor JAMES HENDRICK, B.Sc., University of Aberdeen.

Crops obtain their supplies of nitrogen and of ash constituents, such as phosphates, sulphates, potash, and lime, through their roots from the soil, and among the most important of the factors on which the fertility of the soil depends is its ability to supply crops adequately with these necessary constituents. Quite apart from the removal of these substances in crops, they may be lost from the soil in two other ways: (1) through volatilisation, and (2) through escape in drainage. So far as we know, nitrogen is the only one of these substances which is lost through volatilisation, and even in this case the loss does not appear to be a serious one. It is quite otherwise in the case of drainage. Nitrogen and all the ash constituents of the plant may be lost in the drainage water which escapes from the soil, and in the case of certain ash constituents, such as lime and sulphates, far more is removed from the soil in this way than is removed by crops. The measurement of drainage water, and of the nitrogen, phosphates, potash, lime, &c., which it contains, has therefore considerable practical importance in connection with soil exhaustion and with the determination of the rate of exhaustion of the manurial materials which are applied to the soil.

Many analyses have been made of drainage waters from cultivated land. The most important series of such analyses made in Britain has been made on drainage waters collected at the Rothamsted Experiment Station. These analyses show that certain substances, such as sulphates, chlorides, and nitrates of lime, soda, magnesia, and potash, normally occur in the drainage of cultivated land. They also tell us something about their relative proportions and their variation with season, manuring, &c. Thus we know that lime is generally washed away in much greater amount than potash, and that sulphates are more constant constituents of drainage than nitrates, and that both of these are much more freely washed away than phosphates, of which nothing more than mere traces are found in ordinary field drainage.

The following Table gives the composition of samples of drainage water obtained during the years 1866 to 1869 from differently manured plots—wheat plots in the famous

Broadbalk field at Rothamsted. The analyses were made by the late Dr Voelcker.

TABLE I.—COMPOSITION OF DRAINAGE-WATERS FROM BROADBALK FIELD, ROTHAMSTED. Parts per million.

Plot.	Treatment.	Lime.	Magnesia.	Potash.	Soda.	Phosphoric acid.	Sulphuric acid.	Chlorine.	Nitrogen as Nitric acid.	Nitrogen as Ammonia.	Total solids.
2	14 tons farmyard manure	147·4	4·9	5·4	13·7	..	106·1	20·7	16·1	·16	476·1
3 and 4	Unmanured	98·1	5·1	1·7	6·0	·03	24·7	10·7	3·9	·12	246·4
5	Mixed mineral manure	124·3	6·4	5·4	11·7	·91	66·3	11·1	5·1	·13	326·0
7	Mixed mineral manure and 400 lb. ammonium salts	181·4	8·3	2·9	10·9	·91	90·1	26·1	14·0	·07	492·4
9a 9b	Mixed mineral manure and 550 lb. nitrate of sodium 550 lb. nitrate of sodium	118·1	5·0	4·1	50·1	..	41·0	12·0	18·4	·24	423·9

The "mixed mineral manure" consisted of 3½ cwt. bone-ash superphosphate, 200 lb. commercial potassium sulphate, 100 lb. sodium sulphate (nitre-cake), and 100 lb. of crystallised magnesium sulphate.

The "ammonium salts" were a mixture of equal parts of the sulphate and muriate of commerce.

The figures given in the table are not the results of a single analysis, but are mean results. In the case of Plot 2 they are calculated from two analyses, and in the case of the other plots from five analyses of samples taken in the months of December, January, April, and May. They do not therefore represent the average composition of the drainage all the year round, but merely the average of a few sporadic samples taken in the winter and spring.

The analyses show clearly, however, that the composition of the drainage varies with the manuring. Manuring, whether with dung or artificials, increases the amount of solid matter washed away in the drainage as compared with the unmanured plots.

Lime is the principal base washed away from this Rothamsted soil, and there is more of it in the drainage than of all the other bases—magnesia, potash, and soda—put together. The amount of lime in the drainage from the manured plots is much greater than that from the unmanured, and it is especially great in the case of the plot manured with ammonium salts.

Of the acid constituents in the drainage, the principal is sulphuric acid, and very little phosphoric acid is found even in the drainage of plots like Nos. 7 and 9, which received a considerable dressing of soluble phosphate every year in the form of bone-ash superphosphate.[1]

The results obtained from the analysis of drainage waters are useful so far as they go, but they are not sufficient. The information they supply is only qualitative, not quantitative. It tells us that certain substances are washed away in drainage, some more than others, but it does not tell us the amounts in pounds per acre per annum, and therefore gives no accurate information on which to base tables of soil losses or of the rate of exhaustion of manures. At present our information on these subjects is very incomplete, and the views which are commonly held as to the exhaustion, for instance, of potash and lime under different conditions of rainfall, soil, manuring, and cropping are based on little accurate information. Yet from this scrappy information scales for the valuation of unexhausted manures are built up, which are confidently used by valuers, in the belief that they are applying an accurate scientific standard.

QUANTITATIVE DRAINAGE DETERMINATIONS.

In order to obtain complete and exact information concerning what is leached from the soil by the water which passes through it, we require to know the amount of drainage which comes through the soil as well as its composition. To measure this, it is necessary to enclose an area of soil under such conditions that all the drainage which runs through can be collected and measured, and average samples taken from it at intervals for analysis. Instruments for measuring the amount of drainage are known as drain gauges or lysimeters. The best-known drain gauges in this country are those at Rothamsted, and till a set was built recently at Craibstone, the experimental farm of the North of Scotland College of Agriculture, these were the only ones in Britain which had been constructed with an agricultural object in view. There are a few others which, so far as I am aware, are all situated in England, and which are used to measure percolation only, with a view to its bearing on water-supply. No analyses are made of the drainage from these, and therefore no information is obtained from them as to what is washed from the soil.

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[1] A full account of these experiments is to be found in the original paper on "The Composition of Waters of Land Drainage," by Dr Augustus Voelcker, F.R.S., 'Jour. Royal Agric Soc ,' 2nd series, vol. x., 1874, pp. 132-165. They are further dealt with in a paper "On the Amount and Composition of the Rain and Drainage Waters collected at Rothamsted," by Lawes, Gilbert, and Warington, ibid., 2nd series, vol. xvii., 1881, pp. 311-350, and vol. xviii., 1882, pp 1-71.

They are maintained chiefly by water engineers, and yield little information of direct agricultural value.

The Rothamsted drain gauges are three in number, and consist of blocks of soil each one-thousandth of an acre in area, enclosed by water-tight walls of masonry, and supported by perforated iron plates, through which the drainage escapes to suitable collecting and measuring vessels. The blocks of soil were built around, and supported in their natural condition, without being broken up or interfered with unduly. These drain gauges are described in a paper by Lawes, Gilbert, and Warington in the 'Journal of the Royal Agricultural Society.'[1]

In the case of the lysimeters used by water engineers, the soil is usually filled into a tank after it is built, a method which is much less troublesome than building the tank round a block of soil in its natural condition. But for agricultural drainage experiments, it is much better that the block of soil should be in its natural condition. Even if the soil and subsoil are filled into the tank of a lysimeter separately in their natural order, the thorough breaking up and aeration which they thus undergo alters their state of consolidation, and the manner and rate in which water and air will pass through them, and accelerates chemical changes, especially in the subsoil. Years will probably be required for the soil to settle down again into its natural condition, if it ever does.

The Rothamsted drain gauges were originally constructed by Lawes and Gilbert in the summer of 1870, and it is stated that they were made "to ascertain the amount of natural drainage through the Rothamsted soil when left bare of vegetation; the effect of a crop is thus for the present excluded. The drainage waters obtained have been analysed; their composition will be found to illustrate in a striking manner the loss of plant food which an uncropped soil may suffer from the percolation of rain water."

They are neither cropped nor manured. They measure, (*a*) the amount of the rainfall which percolates through the soil and escapes in the drainage: by subtracting this from the total rainfall, which is measured by a rain gauge alongside, the amount of evaporation from a bare soil is obtained; (*b*) the nitrogen which is washed away from the soil as nitrate and nitrite, and this, it is presumed, measures the rate at which nitrification takes place in soil kept under the conditions of these drain gauges. The losses of lime, potash, phosphates, and other ash constituents are not measured; and as the soil is neither cultivated nor manured either with nitrogeneous or with other manures, and as no crops are grown upon it, little information is obtained from these long-continued experiments as to the rate of exhaustion of manures, or as to the losses of manurial constituents from the soil under farming conditions.

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[1] Second series, vol. xvii., 1881, pp. 241-279.

Agricultural drain gauges have been constructed in several other countries besides Britain. The famous French agricultural chemist, Dehérain, had an extensive set built at the Experimental Station of the Agricultural High School of Grignon. Sets have also been made at Cawnpore and Pusa, in India; at Bromberg, in Germany; at the New York Agricultural Experiment Station, Geneva; the Texas Agricultural Experiment Station; the Indiana Agricultural Experiment Station, and at Cornell University Agricultural Experiment Station, Ithaca, in the United States; and at the Sugar Planters' Association Experiment Station in Hawaii. Several of these are on a much more extensive scale than any we have in Britain, but most of them appear to have been constructed by filling the soil into the lysimeter tanks after they were built. In most cases the soils of the lysimeters are cropped and manured, and, with the exception of the set at Grignon, most of those mentioned above have been constructed in comparatively recent years. Though much valuable information is to be gained from a study of the records of foreign drainage work, the great differences in soil, climate, and rainfall limit the applicability of the work to British conditions.

THE CRAIBSTONE DRAIN GAUGES.

When the North of Scotland College of Agriculture acquired the farm of Craibstone for experimental purposes, it was decided to undertake soil and drainage investigations, and to construct a set of drain gauges. A scheme of research was drawn up, and received the approval of the Development Commissioners and the Board of Agriculture for Scotland, from whom grants were obtained for the construction of the drain gauges and for other purposes. A Joint-Committee of the University of Aberdeen and the College of Agriculture was formed, under whose control all the research scheme, including the portion dealing with soils and drainage, has been carried on up to the present.

The drain gauges were constructed in the summer of 1914 in the South Meethill field, not far from the farm buildings and the new research laboratory, on a piece of ground with a gentle slope to the south. The soil of Craibstone is typical of large areas of soil in the North-East of Scotland, and differs very greatly from that of Rothamsted. It varies considerably in depth from place to place, is irregular in slope and, to a lesser extent, in texture. It is of glacial origin, tends to be sour in reaction, and contains no carbonate of lime. Its nature and constitution and the fundamental differences which distinguish it from the soil of Rothamsted and most other places in the South-East of England have been dealt with elsewhere.[1] The average rainfall in the neighbourhood of Craibstone is about 30 inches per annum, which is quite similar to that of Rothamsted; but the climate differs in other respects very greatly from that of Rothamsted, as Craibstone is about 400 miles farther north, and is situated only 5 miles from the North Sea.

The Craibstone gauges are three in number, and it was decided to make them, like those of Rothamsted, each one-thousandth of an acre in area, which is a convenient size for purposes of calculation. Although we were warned by practical men of the difficulties of enclosing blocks of soil of this size *in situ* without disturbing them, it was decided that the advantages of having natural undisturbed soil were so great that it was worth the greater expense, trouble, and risk involved to have them constructed in this way. It was further decided that each of the drain gauges should contain soil 40 inches in depth. It was considered that this would give quite sufficient depth of subsoil for the growth of all the ordinary field crops of this district, and would represent a depth quite as great as that at which drains are now commonly placed. At Rothamsted the drain gauges differ in depth, one being 20 inches deep, another 40 inches, and the third 60 inches.

THE OBJECTS IN VIEW.

The drain gauges were constructed with the following objects in view:—

(1) To measure the amount of the rainfall which percolates through an arable soil 40 inches deep which is cropped in the ordinary method of the district. So far as possible, the small areas of soil included in the drain gauges are to be cropped in the ordinary rotation of the district, and to be cultivated like the surrounding land. So far as the experiments have gone, the same crops have been grown on the gauges as on the surrounding field. It is intended to continue this practice. The drain gauges have to be cultivated by hand, but the cultivation is done at approximately the same time, and is roughly similar to that of the surrounding field. The rainfall is measured by a rain gauge, which is placed beside the drain gauges; and by subtracting the drainage from the rainfall, we obtain a measure of the total amount of evaporation from the soil directly and through the crop.

(2) To measure the loss of lime and the other bases—magnesia, potash, and soda—from the soil. Craibstone soil,

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[1] 'Studies of a Scottish Drift Soil," by J. Hendrick and W. G. Ogg, 'Jour. Agric. Science,' vol. vii. (1916), pp. 458-469; vol. x. (1920), pp. 333-357.

like most of the soil of the district, contains no carbonate of lime, and tends to be sour, yet it will continue to grow crops for a long period of years without lime and without giving any marked indications that it is becoming sourer. When well treated, though not limed, heavy crops can be obtained from it, and nitrification appears to continue normally. Even such a potentially acid manure as sulphate of ammonia can be used upon it in any ordinary quantities with advantage. These conditions are quite different from those which prevail at experiment stations, such as those at Rothamsted and Woburn, and it is of the greatest interest and importance to determine the losses of lime and other bases in the drainage from such a soil. As one of the main objects of the experiments is to determine the losses of lime from the soil, it is obvious that materials like mortar and cement, which contain lime, are not suitable for use in the construction of the drain gauges. The method of construction which was used at Rothamsted, where the containing walls are built of bricks with mortar and cement, was out of the question at Craibstone. Eventually it was decided to enclose the blocks of soil with thick slabs of slate jointed together, and luted with clay and a special cement free from lime. This has been done. Slabs of selected Caithness slate, 1½ inches thick, were obtained, and each side is made of one slab, while the bottom of each gauge is made of two slabs. The sides of each gauge are bound together with steel straps, and the bottom is supported on steel girders.

(3) To measure the loss of nitrogen as nitrates and, when any is present, as nitrites and ammonia, and the loss of phosphates, chlorides, and sulphates from the soil. The loss of nitrogen compounds has been measured at Rothamsted over a long period of years, but from soil which is neither cropped nor manured. The presence of crops which will take up nitrate during the growing period will introduce an important factor which is absent at Rothamsted. It is also intended to measure any loss of phosphate which takes place through the drainage, and the loss of chloride and sulphate. These have not been measured in the case of the Rothamsted gauges.

(4) To measure the effects of manuring and liming on the drainage and on the materials washed away in the drainage. In order to do this one of the drain gauges is to be cropped without being manured or limed; the second is to be manured as well as cropped, but no lime is to be added; while the third is to be manured and cropped in the same way as the second, but is also to be limed. From the results obtained from the different gauges, we hope in time to accumulate direct evidence as to the rate at which lime and manures are exhausted from the soil through drainage. This plan of experiment involves a great deal of laborious analysis. Not only are average

samples of the drainage from each drain gauge analysed monthly for all the constituents mentioned above, but all the crops grown have to be weighed and analysed, and all the lime and manures supplied to the gauges have to be carefully weighed and analysed. Analyses have also to be made of the soil.

THE CONSTRUCTION OF THE DRAIN GAUGES.

The lysimeters were built in the summer of 1914, and each consists of an unbroken block of soil 7 feet 9 inches long, 5 feet 7½ inches broad, and 3 feet 4 inches deep, enclosed, as stated above, in slate slabs. A position was chosen for them on a gentle south slope in the south-east of the South Meethill field. An exploratory trench was first made to determine the nature and depth of the soil, and its freedom from boulders. Erratic blocks are liable to be met with anywhere in the subsoil, and we wished, if possible, to avoid these. The soil appeared to be fairly uniform in depth and in texture, and to pass into the subsoil with a distinct change of colour at a depth of 9 or 10 inches. Unfortunately, when the blocks of soil were excavated only a few feet away from where this first exploratory trench was made, it was found they were by no means uniform in depth, but exhibited great differences, such as are apt to be met with in this variable soil.

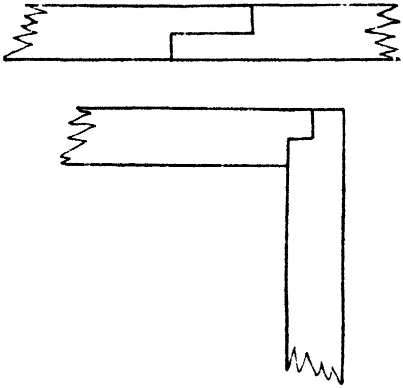
Some difficulty was experienced in getting anybody to undertake the work of construction, and certain of those approached attempted to demonstrate that it would be a much more reasonable proceeding to build the tanks first and then fill them with soil. When it was insisted that the blocks must be built round without being moved or broken, it was even stated that what was required was impossible, unless very great expense in preliminary engineering work was incurred. Eventually a Durham miner was obtained as foreman, and after he had examined and deepened the exploratory trench, he declared that the subsoil was so firm and coherent that there would be no special difficulty or danger in cutting under the blocks at the required depth. He therefore made an excavation below each of the blocks of soil which was to be enclosed, squared off the blocks below, placed the slate bottoms in position, and supported them by brickwork and steel girders. The slate bottoms were given a slope of 1½ inches from the back to the front, and the space so left below the block of soil was filled up as completely as possible with granite chips, to allow of the easy flow of drainage to the front of the lysimeter, where the slates were perforated by a series of six holes, each ⅜-inch in diameter, to permit the escape of the drainage.

During the construction of the deep trench in front of the drain gauges and the tunnels under them, some erratic blocks were encountered, but all were below the 3 feet 4 inches level, and did not interfere with the blocks of soil which were being excavated, though one was so large that there was some difficulty in removing it without interfering with the lower part of one of the blocks. It was also found that the material which was excavated was very hard and compact. It consisted of partially weathered glacial detritus.

When the slate bottom of each block was securely placed in position, the sides were excavated and carefully cut perpendicular and to the required size. The side slabs were then fixed in position and jointed to one another and to the slate bottoms with right-angled joints, as shown in Diagram I. The joints were luted with a special cement, free from lime, and were set in clay. It was difficult to get the workmen to realise the importance of the jointing, and to understand that every part of it must be water-tight. As the sequel showed, they did not make the joints water-tight. When the sides were placed in position they were bound together by angle-steel straps running round the outside, and screwed together at the corners. Before these straps were tightened up the joints were filled with cement. The bottom of the pit in front of and below the blocks of soil was then laid with concrete, with a gentle fall to a drain, by means of which all surplus water could escape down the slope which lies to the south of the drain gauges. The whole of the sides of the pit were also bricked up.

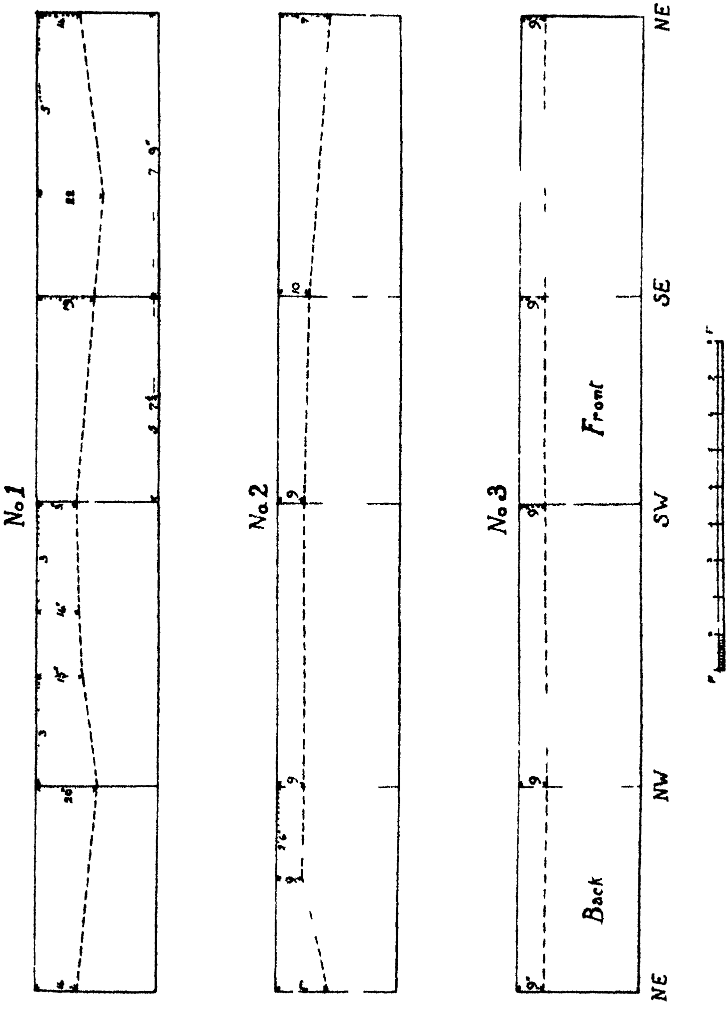
DIAGRAM I.

THE JOINTING OF THE SLATES.



The drainage from each lysimeter is collected in a galvanised-iron gutter, which is fixed under the drainage holes in the front of the bottom slabs, and is led into galvanised-iron collecting tanks. Below each lysimeter two collecting tanks were placed, each of which holds half an inch of drainage. They are connected so that as soon as the first is full it overflows into the second. It was soon found that on occasions of very heavy rainfall or rapid thaw, more than an inch of drainage may run through in twenty-four hours. A third tank, large enough to hold 1 inch of drainage, has therefore been added to the collecting battery of each lysimeter, and is so attached that when the second ½-inch tank is full it overflows into this 1-inch tank. On no occasion has the drainage greatly exceeded 1 inch in twenty-four hours, though

DIAGRAM II



there have been several periods of exceptionally heavy rainfall since the drain gauges were built, so it is unlikely that more than 2 inches of water will pass through in twenty-four hours.

The measuring tanks were calibrated in my laboratory at Marischal College by the late Robert Glegg, B.Sc., and the amount of water in each is read off on a gauge-tube attached to the side of the tank.

While the blocks of soil were being pared down to size, samples of the soil and subsoil from the sides of each of the blocks were taken and preserved for analysis and future reference. A sketch of the depth of the dividing line between soil and subsoil on the four sides of each of the lysimeters was prepared at the same time. This is shown in Diagram II. (p. 65).

When the exploratory trench was made it was found, as stated above, that the soil was of a fairly uniform depth; but unfortunately, when the blocks of soil had been isolated, it was found that the same was by no means the case with them. In one block, No. 3, the division between soil and subsoil is almost uniformly at a depth of 9 inches, but, on the other hand, in No. 1 it varies from 13 to as much as 22 inches, and in No. 2 from 9 to 17 inches.

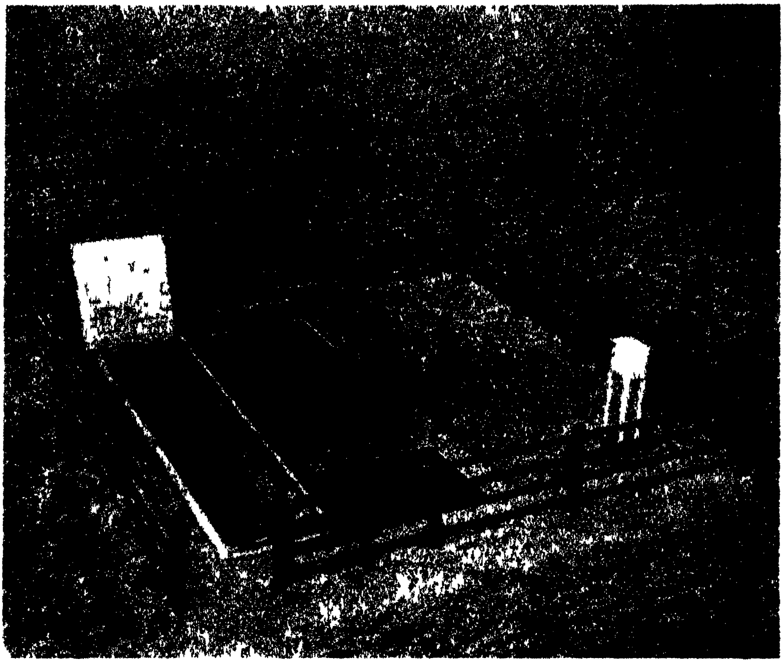


Fig 1 —*The Drain Gauges before the removal of the wooden fence.*

The lay-out of the drain gauges is shown in Figs. 1 and 2, which are reproduced from photographs taken from above, so as to show the pit in front of the drain gauges and the collecting vessels below them. In the illustrations the pit is open, but it is usually covered by a wooden cover, which keeps out the sun and prevents the bottom and front of the gauges becoming unduly heated in summer, and also keeps out rain. The cover is also sufficient to prevent freezing in winter, except in the case of severe and prolonged frost, when a layer of straw would be added as an additional protection. So far, it has not been necessary to use any protection in addition to the wooden cover, as no frost yet experienced has penetrated through it sufficiently to cause water to freeze in the pit.

TESTING THE DRAIN GAUGES.

Records of the rainfall and of the drainage which passed through each lysimeter began to be taken in 1915. The records obtained were unsatisfactory, and indicated that there were leaks in the joints. It was decided, therefore, to open up the outside of each lysimeter, and test the joints on the first opportunity provided by a period of weather so dry that nothing was passing through the gauges. Partly owing

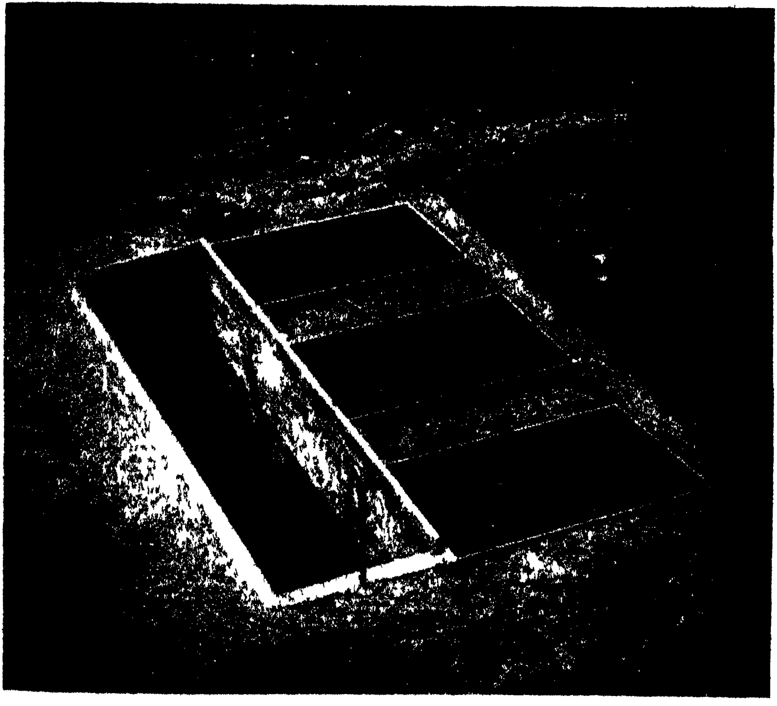


Fig. 2.—*The Drain Gauges after the removal of the fence*

to unsatisfactory weather and partly owing to difficulties caused by the war, nothing could be done in 1916.

A suitable opportunity was found in June 1917, and after the whole of the sides of the drain gauges had been laid bare, the holes in front were blocked up, and water was sprinkled in equal amount over the surface of each gauge. As it could not escape by the usual drainage holes, it soon began to escape by the leaks in the joints, several of which were located in this way and repaired after the surplus water had flowed away and the joints become dry again.

A waggon-load of brick clay was also obtained from the brick-works at Port Erroll, and a layer about a foot deep was tramped in with the aid of water round the joints connecting the side and bottom slabs. Below and above this layer of clay " weepers " were placed, opening through the brick-work into the pit, as there was evidence that water had been trapped in the bays between the slate sides of the drain gauges and the brick wall of the pit in front. These weepers effectively prevent any water collecting either above or below the clay layer.

In spite of all these improvements, it was again found that satisfactory records were not being obtained, and there appeared to be leaks where the joints were covered by parts of the brick-work, which had not been reached during the repairs made in 1917. In June 1918 the sides were again laid bare by removing the earth around the gauges, and the whole layer of clay which had been tramped in. Portions of the brick-work were also removed, so as to lay bare all those parts of the joints which were not reached in 1917. When a dry period arrived and the gauges ceased to pass any water, they were again tested by stopping up the drainage holes and sprinkling water on the surface, and some further leaks were found, and, in particular, one very bad one, which had been quite concealed by the brick-work. These were made good, and the whole structure was again tested and found tight before the earth and clay were finally filled in in October 1918.

My thanks are due to Mr Wm. Tawse, engineer and contractor, Aberdeen, who gave me great assistance in finally making the gauges tight. He placed a specially skilled and reliable man at my disposal, both in 1917 and 1918, who packed the joints tight with cement free from lime wherever there was indication of any leakage. It causes much trouble and expense to make good such defects after the gauges are completed, and it would have saved much trouble and time had the men who originally cemented the joints understood the great importance of making them entirely water-tight, and taken adequate means to secure this end.

It has been thought well to give an account in some detail of some of the difficulties we encountered in constructing these drain gauges, as it may be of assistance to others who may wish to undertake similar work. We had no previous experience to guide us when we started, as no similar installation has been constructed anywhere else. The Rothamsted drain gauges are of quite different construction, and were designed with somewhat different objects in view. Also, there is no detailed account of their construction or of any difficulties encountered, to be found in the Rothamsted Memoirs. Detailed accounts have been published of the construction of certain of the Indian and foreign drain gauges, but, owing to the great difference in conditions, these were of little assistance to us.

THE RECORDS DURING 1919 AND 1920.

Reasonable assurance having been obtained that the drain gauges were tight, formal recording began on 1st January 1919. The record is taken daily at 9 A.M. The rainfall is measured by a 5-inch Snowdon rain-gauge, of the standard type of the Meteorological Office, which is placed beside the drain gauges as shown in the illustration on page 67. The amount of drainage which has come through each drain gauge during the preceding twenty-four hours is at the same time measured, and entered in a book kept for the purpose. From time to time, when sufficient drainage has collected, the collecting tanks are emptied, and an aliquot part of the runnings from each lysimeter is set aside. On the first of the month the tanks are always emptied, and an aliquot portion taken, and a new record is then begun for the new month, so that the record for each month is from 9 A.M. on the first of that month to 9 A.M. on the first of the succeeding month. The aliquot parts collected during the month from each lysimeter are mixed, and from that mixed sample, representative of the lysimeter for the month, the portions required for analysis are taken.

The monthly samples of drainage from each lysimeter are taken to the laboratory, and analyses are made showing the principal constituents contained in the drainage, and these are calculated to parts per million of water and to pounds per acre washed from the soil.

During both the years 1919 and 1920 oat crops were grown on the drain gauges, as well as on the surrounding field. The drain gauges were not manured in either year. No manure has been applied to the soil contained in them since 1912, nor has it received any lime in recent years—certainly not since 1900. It is intended to begin manuring and liming during the present year.

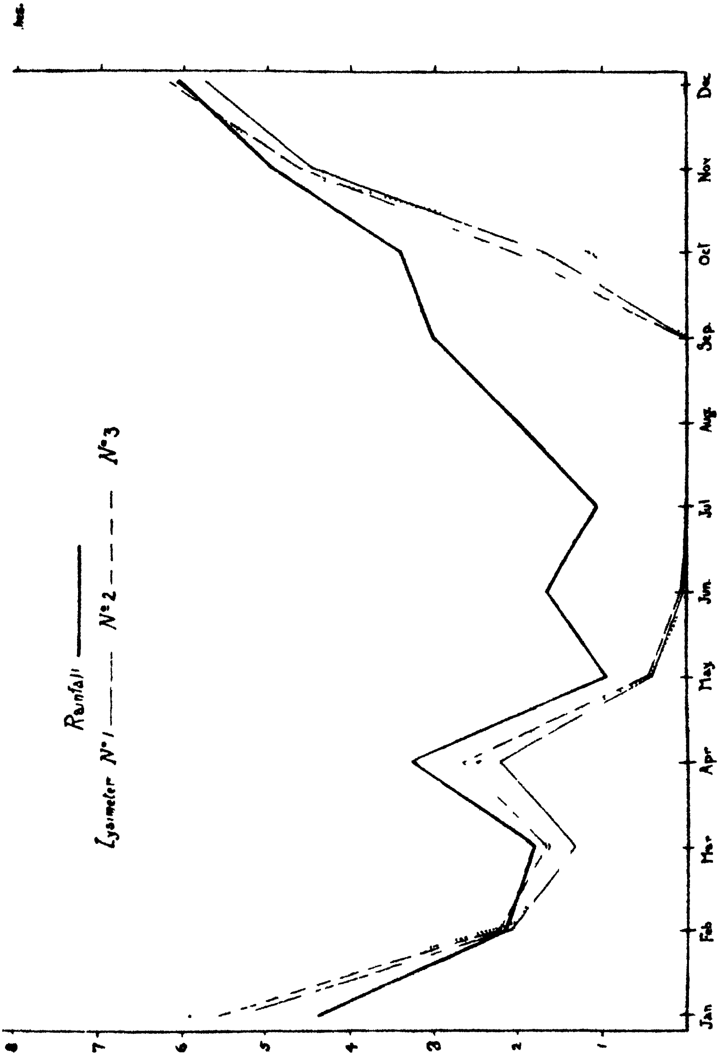
TABLE II.—RAINFALL AND DRAINAGE DURING THE YEARS 1919 AND 1920 (in inches).

MONTH.	1919				1920.			
	DRAINAGE.			RAIN	DRAINAGE			RAIN
	Lysimeter 1	Lysimeter 2	Lysimeter 3.		Lysimeter 1	Lysimeter 2.	Lysimeter 3	
January . .	5·31	5·63	5·81	4·37	2·18	2·30	2·23	1·83
February . .	2 11	2·19	2 05	2 15	1·07	1·20	1·20	1·05
March . . .	1·34	1·70	1·68	1·82	1·70	1·90	1·95	2·89
April . . .	2·24	2·68	2·54	3·26	1·32	1·42	1·36	2·51
May . . .	39	·44	·40	·92	1·91	2·03	1·88	3·90
June . .	·01	·02	01	1·67	·23	·25	·19	·90
July . . .				1 08	.	..	·01	3·86
August . . .	..			2·00		·02	.	2·34
September . .				3·01	·26	·51		2·41
October . .	1·70	2 03	1·18	3·40	4·27	4·35	2 92	4·28
November . .	4 48	4·64	4·79	4·99	1·13	1·15	1·18	1·93
December . .	5·74	6·18	6·06	6 05	4·02	4·10	3·85	4 35
Total for year .	23·32	25 51	24·52	34·72	18·09	19·23	16·77	32·25

In Table II. the drainage from each lysimeter and the rainfall are given for each month of the years 1919 and 1920. The same is shown graphically in Diagrams III. and IV. It will be noticed that in each year the drainage in January considerably exceeded the rainfall, and that in February also it either exceeded the rainfall or was about equal to it. A mass of soil 40 inches deep is able to hold a great quantity of water. When rain falls on the surface some of this water may escape below in the drainage, but the water which is escaping probably fell on the soil many days or weeks before, and only flows away as drainage after slowly percolating through the soil, or when new water falls on the surface and gradually forces it out below. When the rain ceases and dry weather follows, the drainage continues to drip for many days after rain has ceased, though the flow becomes gradually slower. Consequently during the winter months the drainage never ceases flowing. In wet weather it flows more rapidly, and in dry weather more slowly, but it always flows, till in late spring or early summer evaporation becomes great enough to check it. When during the winter months the end of a month is wet, a large part of the drainage which flows away in consequence escapes in the succeeding month. October, November, and especially December 1919 were wet months, and at the end of the year the soil was laden with moisture, much of which gradually escaped in the early part of 1920. On the other hand, January and February 1920 were comparatively dry months, but in them the drainage exceeded the rainfall, because of the surplus of water from 1919.

DIAGRAM III.

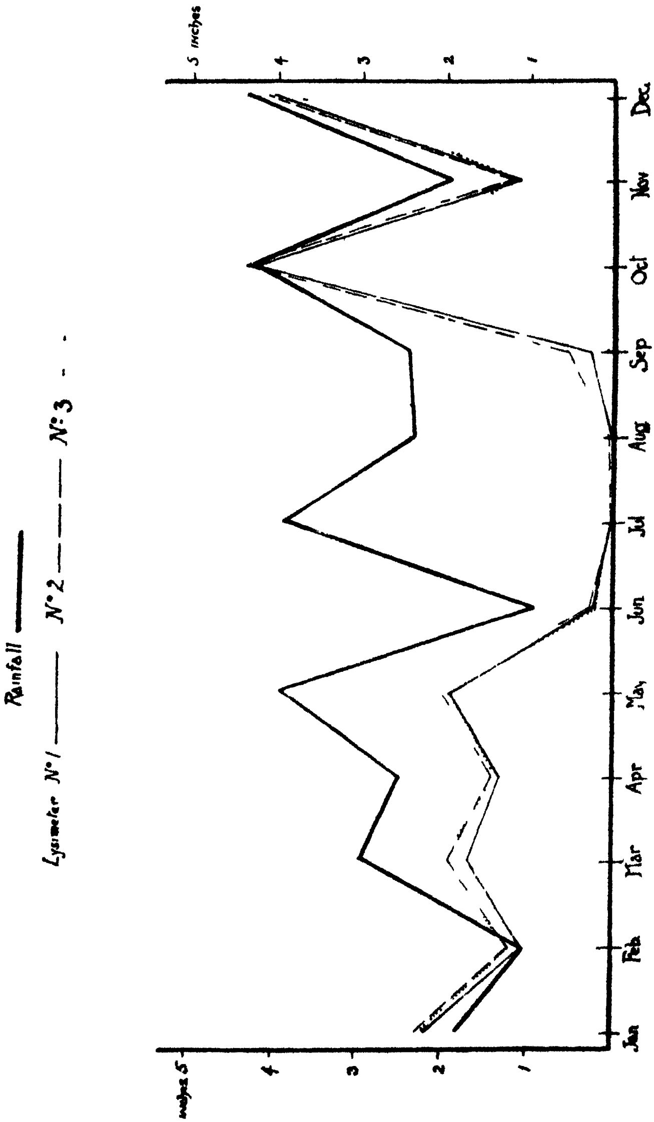
RELATION OF DRAINAGE TO RAINFALL DURING 1919.



At the end of 1918 there was heavy snow at Craibstone. This melted early in 1919, and swelled the drainage record for January, which was itself a wet month. Not only so, but the snow drifted, and lay deeper on Lysimeter 3 than on the other two; consequently our record starts with a greater flow of drainage from No. 3 than from Nos. 1 and 2.

DIAGRAM IV

RELATION OF DRAINAGE TO RAINFALL DURING 1920.



Other factors, apart from rainfall, which influence the rate of flow of drainage are the atmospheric pressure and the temperature. As the temperature rises, drainage flows away more freely. Hence when mild weather sets in in spring there is sometimes a considerable flow of drainage, even when there is no rainfall.

It has been found that the escape of drainage takes place at unequal rates from the three lysimeters. This was noticed when they were tested in 1917 and 1918, by artificially applying equal amounts of water to each during dry weather in summer. It was then found that No. 2 always began to flow before the others, but, on the other hand, once the drainage began to run away from the others it escaped faster from them, so that No. 2 began to run first and continued to run longest. It was also noticed that when water was sprinkled rapidly on the surface it did not escape so quickly into the soil in the case of No. 2 as in the case of the other lysimeters, and, therefore, water began to lie on the surface of No. 2 more readily than was the case with the others. Somewhat similar phenomena can be noticed with the natural drainage recorded in Table II. In 1920 No. 2 began to flow in August, in which month nothing came from the others; and in September No. 2 gave far more drainage than No. 1; while No. 3 still gave no measurable amount. In 1919 also, after the dry period, No. 2 began to flow first, and gave more drainage during October than either of the other lysimeters.

The unequal way in which the drainage escapes from the different lysimeters is no doubt the result of inequalities in consolidation and character in the soils. It has already been pointed out that the soil at Craibstone is very variable, and Diagram II. illustrates how much it varies in depth in the space of a few feet.

In each year the drainage ceased to flow from all the lysimeters for a time during the summer, and for from two to four months practically no water flowed from them. As the days become longer and evaporation increases during March and April, the drainage becomes distinctly less than the rainfall. In 1919 the months of May, June, July, and August were all comparatively dry. During May there was little drainage, and practically nothing escaped in June. Not a drop escaped from any of the lysimeters during the whole of July and August. During September the weather became wetter, but no recordable amount of drainage escaped, though after a wet period towards the end of the month a few drops flowed from Nos. 1 and 3, but nothing from No. 2. It was only during October that drainage began again to flow away in any quantity.

Except during the month of June, 1920 was much wetter during the late spring and summer than 1919. Nevertheless, the drain gauges remained almost dry during the months of July and August. Nothing at all escaped from No. 1 during these months, and only ·02 inch from No. 2 in August and

·01 inch from No. 3 in July. On the other hand, nothing measurable escaped from No. 3 during September, though a very appreciable amount of water escaped from both the others during this month. The drainage always passes more slowly through No. 3 than through the others.

So far as the records go, they show that during the warmest summer months, even when there is a considerable rainfall, as in 1920, the whole of the rainfall is re-evaporated from the surface of the soil or transpired by the crop grown upon it, and practically nothing escapes in the drainage. During the four months 1st June to 30th September the total rainfall in 1919 was 7·76 inches, while the drainage was practically nothing; and in 1920 the rainfall was 9·51 inches, while the drainage averaged about half an inch. On the other hand, during the four months from 1st November to the end of February, when there was no crop on the soil, and when the days were short, the weather cold, and evaporation restricted, the drainage was equal to the rainfall. In 1919-20 during these four months the rainfall recorded was 13·92 inches, and the drainage averaged 14·02 inches.

Some of the factors which cause the uneven flow from month to month from the different lysimeters have already been mentioned. It is probable that another slight cause of irregularity has been the fence which was erected round the lysimeter and meteorological instruments to prevent animals straying on to them when the surrounding field is in grass. This fence was made of wood, and its east and west sides were only about three feet distant from the outside lysimeters, and must have protected them to some extent. It is noticeable that the centre lysimeter, No. 2, has, as a rule, given a somewhat higher record than either of the other two. The wooden fence has now been removed, and replaced by one of barbed wire, placed at a greater distance from the lysimeters. (See the illustrations, pp. 66, 67.)

THE SUBSTANCES WASHED AWAY IN THE DRAINAGE.

The monthly analyses of the drainage waters give us a record of the principal soil constituents washed away in the drainage, and therefore of the exhaustive effect of drainage on the soil. The average results for the years 1919 and 1920, stated as parts per million of water, are given in Table III. (p. 75).

If these results be compared with those from Rothamsted, given in Table I., great differences will be noticed. The difference is especially marked in the case of the bases. At Rothamsted far more lime is present in the drainage than all the other bases put together. The amount of lime in the drainage from the unmanured plots is over 98 parts per million, while in the case of the Craibstone lysimeters, which have also been unmanured for several years, it is only 20 to 30 parts per million. On the other hand, at Rothamsted the amount of magnesia is only 5 parts per million, and soda only 6 parts per million in the case of the unmanured plots; while at Craibstone the magnesia varies from 9·2 to 11·7 parts per million, and the soda from 18·9 to 28 parts per million. In fact, at Craibstone the proportion of soda in the drainage from Lysimeters 1 and 2 is greater than the proportion of lime both in 1919 and in 1920, and lime forms only a fraction of the total amount of basic material washed away in the drainage. It is evident that there is a very notable difference in the constitution of a soil of this type, and in the solution of bases in the soil water, as compared with a soil of the type of that at Rothamsted.

TABLE III.—AVERAGE COMPOSITION OF DRAINAGE.
Parts per million.

	1919.			1920.		
	Lysimeter 1.	Lysimeter 2.	Lysimeter 3	Lysimeter 1.	Lysimeter 2.	Lysimeter 3.
Lime (CaO)	23·0	22·0	30·0	20·8	19·5	23·2
Magnesia (MgO) . . .	11·6	10·9	11·7	10·3	9·2	9·9
Potash (K_2O) . . .	4·2	3·9	4·0	4·3	3·8	3·7
Soda (Na_2O)	28·0	24·3	27·8	21·0	20·0	18·9
Phosphoric acid (P_2O_5). .	traces	traces	traces	traces	traces	traces
Sulphuric acid (SO_3) .	23·9	27·5	25·2	23·2	22·0	21·3
Chlorine (Cl) . . .	17·4	17·4	17·4	14·9	14·9	15·7
Silicic acid (SiO_2) . . .	31·0	32·9	29·9	40·7	40·1	33·1
Nitrogen in nitric acid . .	10·5	10·4	11·7	5·1	4·9	5·2
Total solids in solution . .	178·3	162·0	188·3	162·9	146·9	169·7

By taking account of the amount of drainage and of its composition as shown by analysis, the amount of the principal constituents in pounds per acre washed from the soil can be calculated. The results calculated in this way are given in Table IV. (p. 76).

The lime lost from this soil, measured in pounds per acre per annum, is much smaller than has been recorded elsewhere. Previous results, and especially those obtained at Rothamsted and Woburn from field experiments and from soil analyses, as well as from drainage experiments, have shown that lime is exhausted from the soil at the rate of several hundred pounds per acre per annum. In the case of Broadbalk field, Rothamsted, which is well supplied with carbonate of lime, plots manured annually with ammonium salts lost about 600 lb. of lime per acre per annum, and even a continuously unmanured plot lost lime at the rate of 448 lb. per acre per annum.

In 1920 the lime washed away from Craibstone soil was only about 80 lb. per acre per annum, and in 1919 varied from 112 to 140 lb. per acre per annum. Even if we take into account the fact that the soil was unmanured, this wastage of lime is very much less than has been recorded elsewhere.

While the loss of lime from Craibstone soil is very small, it is not so with the total loss of base; the small loss of lime is made up for by the large loss of soda, and to a lesser extent by the loss of magnesia and potash. It is generally stated that the acid constituents are washed away from the soil mainly in combination with lime. It is not so in the case of this soil. The acids are in combination chiefly with lime and soda, but also to a very appreciable extent with magnesia and even potash. If the total amount of base washed away in 1919 is calculated in terms of lime, it is equal to about 3 cwt. of lime per acre per annum, or just about three times the amount which was actually washed away. This amount of base is of the same order of magnitude as that recorded in other cases for unmanured soils, though in the other recorded cases the base was washed away mainly in the form of lime.

TABLE IV.—MATERIALS REMOVED FROM SOIL BY DRAINAGE IN LBS. PER ACRE.

	1919			1920		
	Lysimeter 1	Lysimeter 2	Lysimeter 3	Lysimeter 1.	Lysimeter 2	Lysimeter 3
Lime . . .	111·64	113·67	139·48	79·02	79·79	84·32
Magnesia . .	55·57	57·86	58·96	37·35	38·68	35·84
Potash . .	22·47	22·00	21·84	16·88	17·29	14·79
Soda . . .	132·07	126·11	127·89	86·40	88·40	76·59
Phosphoric acid .	traces	traces	traces	traces	traces	traces
Sulphuric acid . .	116·38	126·45	125·20	95·42	97·75	92·41
Chlorine .	92·93	101·04	96·80	59·81	63·45	58·09
Silicic acid . . .	173·92	207·37	168·96	161·85	177·87	148·94
Nitrogen in nitric acid .	43·49	43·60	49·64	15·10	17·02	16·99
Total solids in solution	915·76	982·47	1015·90	649·30	658·07	610·87

The loss of potash in the drainage of this soil is very appreciable, and, if the soil were deficient in potash, would indicate a serious wastage of this valuable constituent. The reason, however, why so much potash appears in the drainage is because the available supply in the soil is so large. The ultimate analysis of a soil taken from another part of the field in which the drain gauges are situated showed 1·54 per cent of potash. Table V. shows that the quantities extracted by hydrochloric acid and by dilute citric acid are such as to indicate no want of potash in the soil. In field experiments also it has been found that Craibstone soil does not require potash manures, and responds to their application only slightly even in the case of the potato crop.

The chief acids washed away in the drainage are silicic, sulphuric, hydrochloric, and nitric acids. The amount of silicic acid which is found in the drainage is notable, and evidently a considerable proportion of the bases is washed away in the form of silicates. The sulphuric and hydrochloric acids are similar in amount to those recorded in other cases.

Practically the whole of the combined nitrogen which escaped in the drainage was in the form of nitrate. Ammonia and nitrite were also tested for, but they were either absent or present only in traces. The drainage was always tested for phosphate, but nothing more than traces was ever found. The total quantity is so small that its quantitative estimation would involve considerable difficulty, and for the present purpose it is sufficient to record that only traces were present. The soil itself is well supplied with phosphoric acid, especially when estimated as "Probably Available" phosphoric acid by Dyer's method, with 1 per cent citric acid. Yet so well is the phosphate held by the soil that practically none of it is washed away and wasted in the drainage.

The analysis of the soil, sampled to a depth of 9 inches, and the analysis of the subsoil, from 9 to 18 inches, are given in Table V. The analyses, both of the soil and subsoil, were made on mixed samples representing the average of the three lysimeters.

TABLE V.—ANALYSES OF SOIL AND SUBSOIL OF THE LYSIMETERS.

	Soil	Subsoil
	Per cent.	Per cent.
Loss on ignition (humus, &c.)	7·49	3·07
Containing nitrogen	·224	·072
Sand and insoluble silicates	85·59	89·05
Constituents soluble in strong HCl		
Lime (CaO)	·363	·219
Magnesia (MgO)	·245	·216
Potash (K_2O)	·274	·276
Phosphoric acid (P_2O_5)	·197	·100
Constituents soluble in 1·0 % citric acid		
Lime (CaO)	·0800	·0918
Magnesia (MgO)	·0321	·0296
Potash (K_2O)	·0249	·0049
Phosphoric acid (P_2O_5)	·0475	·0143
"Lime requirement" as CaO	·0796	...
Carbonate of lime	absent	...

An oat crop was grown on the drain gauges both in 1919 and 1920. In 1919 "Potato" oats were sown, and in 1920 "Victory" oats. In both years the seed was sown at the rate of 200 lb. per acre, 1/5th lb. per lysimeter. The weight of crop harvested in each year calculated to pounds per acre, moisture-free weight, is shown in Table VI.

TABLE VI.—Weights of Oat Crops.
Pounds per Acre. Dry Weight.

	1919			1920		
	Grain	Straw	Total	Grain	Straw	Total
	lb	lb.	lb	lb	lb	lb.
Lysimeter 1 .	1998	2338	4336	813	1926	2739
" 2	2106	2215	4321	835	1881	2716
" 3 .	2206	3135	5341	1036	2884	3920

In 1919 the crop was damaged by birds, though the surrounding field was also in oats, so in 1920 the crop was protected by a net. It will be noticed that No. 3 lysimeter gave a much bigger crop in both years than Nos. 1 and 2, the crops in which were nearly equal. Reference to Tables III. and IV. will show that the drainage of No. 3 was in both years somewhat richer in nitrate than that from Nos. 1 and 2. The same tables show also that there was far more nitrate in the drainage in 1919 than in 1920. All the crops were much heavier in 1919 than in 1920. So far as these results go, they indicate that the amount of crop on the different lysimeters and in the different years was dependent, to some extent at any rate, on the amount of nitrate production.

The soil at Craibstone, which represents a type quite common in Scotland, contains a large amount of partially weathered felspathic material derived from igneous and metamorphic rocks. Such materials contain a plentiful supply of potash, soda, lime, and magnesia, together with alumina and iron, all combined with silicic acid and more or less water, to form complex hydrated silicates. Though no carbonate of lime is present, such a soil can continue comparatively healthy for a long period without liming, because bases are supplied from the silicate complex sufficient to carry on the necessary reactions of the soil, including nitrification, and to neutralise the acids which are washed away in the drainage. Such soils form a type quite distinct from those which depend for their supply of base on a store of carbonate of lime. It is this latter type which has been chiefly studied hitherto, and our text-books are apt to assume that it is the universal type. This requires to be corrected, and we require to learn more of the Craibstone type of soils and their properties and distribution.

A much greater amount of work on soil drainage and on the losses of the soil through drainage is also required. Our drain-gauge records in this country are very meagre. Drain gauges are required on different types of soil and in different types of climate, and especially in districts with different rainfalls. Both Rothamsted and Craibstone are situated in districts with a rainfall of about 30 inches. It is very desirable that there should be drain gauges in some of the wet agricultural districts of the country where there is a rainfall of 40 to 50 inches per annum.

Drain-gauge work, if it is to be of any use, is, unfortunately, very laborious. Not only has attention to be given to the drain gauges daily, but a great amount of time-consuming analysis and calculation has to be made. It occupies the whole time of a skilled man to attend to a set of drain gauges such as those at Craibstone and to make the necessary analyses.

I wish, in conclusion, to thank my assistant, Mr Hugh Douglas Welsh, who has charge of the drain gauges at Craibstone, and who has prepared all the tables of figures and the diagrams which illustrate this paper.

ABERDEEN-ANGUS CATTLE.

A HISTORICAL SKETCH.

By JAMES R BARCLAY, Secretary, Aberdeen-Angus Cattle Society.

JUST as the story of every great movement centres round a prominent figure, or a succession of prominent figures, so the history of all our breeds of pedigree stock reveals names which stand out in special prominence on account of the success and extent of their work. This is especially the case in the history of the Black Polled race of cattle known as Aberdeen-Angus. The record of the work accomplished in establishing, improving, and developing the breed is to a very great extent summed up in the life-work of three great men—Mr Hugh Watson, Keillor, the founder of the breed; Mr Wm. M'Combie, Tillyfour, the emancipator of the breed; and Sir George Macpherson-Grant, Bart., of Ballindalloch, the refiner of the breed. Every history of Aberdeen-Angus cattle must provide a prominent place in its pages for the work of these three great master-builders of the fortunes of the breed, whose work on its behalf can be followed in minute detail through the various records that are now available. The names which we have mentioned stand, however, not only for individuals, but for distinct eras, in which each of them had co-workers in breed improvement, so that in considering the evolution and development of the breed as we see it to-day there must be kept in mind the steady, quiet, less prominent work of many breeders throughout the land, guided no doubt, as well as inspired, by the successes of the great triumvirate. In tracing the breed's history there cannot be pointed out each successive step of progress: the work accomplished does not permit of recapitulation in bare cold facts. It is only when we consider that a little over a hundred years ago not a single attempt had been made on systematic lines to "improve" these native cattle of the North-East of Scotland, and think of the position the breed occupies now, that there can be appreciated—and even then only in part—the truly marvellous work that has been accomplished.

EARLY REFERENCES TO POLLED CATTLE.

Volumes have been written with the view of tracing the origin of our domestic races of cattle, but in the diversity of opinions there are but few definite points which can be fixed upon by the student of Aberdeen-Angus history as practically bearing on the pre-improvement stage of the breed's existence. The breeding of cattle is an industry that has been going on for thousands of years; the classification of breeds is, by comparison, a thing of yesterday. Eminent naturalists can but at the best offer conjectures as to the progenitors of Aberdeen-Angus cattle. The testimony of the sculptor's chisel and the artist's brush reveal to us the existence of a hornless breed dating back to a period thousands of years ago. It is easy, therefore, to speculate as to the origin of the breed, but after all it is only speculation. proving, however, the one general fact, as applicable to the existence of a hornless race of cattle in Scotland, that such cattle belong to a race of great antiquity, while the self colour of black is a further indication of the breed's antiquity. This at least can be definitely said in tracing the history of the black hornless cattle now known as Aberdeen-Angus, that the breed is indigenous to the districts in the North-East of Scotland in which it is found, and that the earliest writers on Scottish agriculture, who distinguish between the varieties of stock, note the presence in these districts of a Black Polled race of cattle. As early as 1752 we find mention made of the presence of "humble" oxen and "dodded" heifers in the old territory of Angus, from which in part the breed derives its present-day name. In the adjoining counties of Kincardine, Aberdeen, Banff, and Moray there are equally distinct references of a very early date to Black Polled cattle. A reference of great historical value is found in the publication, issued by the Spalding Club, on 'The Antiquities of the Shires of Aberdeen and Banff' (vol. iii. p. 344). There is there reproduced a legal document describing the ceremony observed at putting John Cumyng of Culter, Aberdeen, into possession of his deceased father's property in 1523. Till 1845, when a property changed owners by death or purchase, sasine or actual possession was given by the Crown or the superior to the new owner by delivering to him on the ground a handful of earth as a symbol of the soil of the property, and a stone as a symbol of the building on it. This was called giving "yird and stane." At an earlier period, when land was held by personal military service, the Crown, before accepting a new owner, claimed a money payment, called relief from an heir, and composition from a purchaser. This made sasine-giving a more important function than it was after the abolition of military service tenure. In the case mentioned, sasine was effected by John Cumyng selecting and accepting *unum bovem nigrum hommyll* —"a black hummel (hornless) ox"—valued at 40s. 8d. Scots. Being a symbol and being selected, it is plain that it was of the kind of oxen common and most esteemed in the county of Aberdeen at the time, and also that this had been a long-established custom.

The composite name—Aberdeen-Angus—is thus derived from districts where, as we have seen, the Black Polled race can be traced for hundreds of years through documentary evidence. For long, however, the designations were used as denoting distinct varieties, Angus cattle and Aberdeen; and more recently, when interchanging of animals amongst breeders became more common, the cattle were styled "Aberdeen-and-Angus." In 1835 a report was submitted to the Highland and Agricultural Society which is of interest, as bearing on the definition of the different breeds at a time when classification was on a very general plan. After dealing with the Shorthorn and West Highland breeds, the report refers to breeds which "form a very mixed class of stock." It then proceeds: "Of these breeds, one distinctly recognised, by its numbers and the permanency of its characters, is the Angus, now extending over the adjoining counties. This is a breed certainly well suited to a large tract of country, and having been cultivated with considerable care, deserves encouragement; and in this class of stock may likewise be placed what is called the Polled Aberdeenshire." Thus in the classification drawn up for the shows of the Highland and Agricultural Society subsequent to 1835, we find the Polled Angus and the Polled Aberdeenshire given distinct and separate titles, the class being for "the Polled breeds of Galloway and the Northern Districts." In 1848 separate classes were provided for the Galloway breed. Of the Northern Black Polled cattle, those bred in Forfarshire and immediate vicinity were termed "Angus," and those bred in Aberdeenshire "Aberdeens"; and to those in which Aberdeen and Angus blood was mingled the term "Aberdeen-and-Angus" was applied. It has been thought well to explain at this point the early designations of the breed, as also to show how naturally it came about that two distinct breeds, the Galloways and the Aberdeen-Angus, came to be recorded together in the same register—'The Polled Herd Book.' As early as 1874 the Marquis of Huntly, the first President of what is now the Aberdeen-Angus Cattle Society, brought the question of the name of the breed under notice; and in 1886 the official designation "Aberdeen or Angus" was altered to "Aberdeen-Angus." It may also here be explained that in the first four volumes of the 'Herd Book' there appeared the pedigrees of Galloway cattle, but in 1877 the Galloway breeders acquired the copyright of their portion of the 'Herd Book.' It was not till 1908 that the name of the Society was altered from "The Polled Cattle Society" to "The Aberdeen-Angus Cattle Society," a similar change being at the same time made in the title of the 'Herd Book,' through the various volumes of which there have passed in the intervening years the record of 118,046 animals.

ESTABLISHING THE BREED.

Although, as we have seen, the Aberdeen-Angus breed can as a race lay claim to great antiquity, it was comparatively late ere any attempt on systematic lines was made to establish it as an improved breed. In considering the steps that were taken to bring about the improvement of the ancient "dodded" "hummle" cattle of the North-East of Scotland, there have to be kept in mind various contemporary conditions which had a distinct bearing on the work that was taken up in earnest by the pioneers of the breed in the early years of the nineteenth century. By common consent the first place amongst these is assigned to Mr Hugh Watson, Keillor, who was born in 1789. That was the year in which Mr Robertson, Ladykirk, made his first purchases of Shorthorn cattle from the Colling brothers; and in the intervening years, while Hugh Watson was yet a youth, there were being sent north from this Berwickshire stronghold of the "great intruder," as well as from other centres, continuous streams of Shorthorn blood, which were having a marvellous effect on the "common cattle of the country." Hugh Watson was but a little over thirty years of age when Barclay of Ury founded the first herd of Improved Shorthorns in the North of Scotland. That was in 1822, and six years later Mr Hay, Shethin, had taken the first Shorthorn bull right into the heart of that other cradle of the Doddies—in Buchan. This new breed from Durham and Yorkshire spread very rapidly in the cattle-breeding districts of Scotland, the more so because it had the field to itself for a considerable time, there being no other "improved" race in the North with which it could come into competition. It is right that these points should be kept in view when dealing with the first attempts that were made to "improve" the native cattle of the North-East of Scotland, and to evolve from the material at hand a distinct recognised breed, which within the succeeding century was to work out for itself a place of leading importance among the cattle breeds of the world.

EARLY ANGUS BREEDERS.

Hugh Watson took up his life's work in the improvement of the native cattle of Angus in 1808, in which year he became tenant of the farm of Keillor. As the nucleus of a herd, he received from his father six of his best cows and a bull, and later on in the same year he purchased the ten best heifers and the best bull that he could procure at the Trinity Muir Fair at Brechin. These he selected because of the extent to which they showed those characteristics which in his mind he associated with the best specimens of the native cattle. It was an immense task which this young man of twenty years of age set himself—to "manufacture" out of the rough material which lay to his hand a breed of cattle with well-defined characteristics and properties. In these days, when we take the existence of the breed as a matter for granted, it is difficult to appreciate the greatness of the task, though all must pay tribute to the success with which it was accomplished. Hugh Watson was a man of great intellectual gifts, indomitable perseverance, and of far-seeing, accurate judgment. Though he was joined later on by many fellow-workers, he is the acknowledged "founder" of the modern breed of Aberdeen-Angus cattle. Mr M'Combie, Tillyfour, whose work on behalf of the breed, though at a somewhat later date, stands out with equal prominence, places Hugh Watson in the front rank of those noblemen and gentlemen who distinguished themselves as breeders of Aberdeen-Angus cattle. "No breeder of Polled Aberdeen and Angus cattle," he says, "will grudge that well-merited honour to his memory. We all look up to him as the first great improver, and no one will question his title to this distinction. There is no herd in the country which is not indebted to the Keillor blood."

There is little doubt but that Hugh Watson was a close student of the breeding methods pursued at Ketton and Barmpton by the Colling brothers; and the sale of Charles Colling's "Comet" in 1810, at the then undreamt-of price of one thousand guineas, must have fired his imagination and whetted his determination. It will not be necessary here —indeed, space would forbid—to follow in detail the steps that Hugh Watson took in the upbuilding of his herd, but to a very large extent these followed the lines which the experience of the great patrons of the more early improved Shorthorn breed had proved to be successful. He was very daring in the working out of his system, paying less regard to affinity of blood in the matings which he arranged than to the quality and choiceness of the animals from which he bred. A study of the earliest volume of the 'Herd Book' reveals many interesting cases of the mating of closely-related animals, but by working on these lines he was able to fix his type, and even to found his families with those characteristics which he had set out to evolve.

It is quite evident that this work of improvement represented a great amount of perseverance and the application of scientific reasoning to the task in hand, for it was not till twenty years after he had started operations that Hugh Watson considered his work sufficiently developed to place its results before the public. This he did in 1829 (Perth), when for the first time at a Highland Show he appeared as an exhibitor of Polled cattle. Like the improvers of other breeds, he attached the greatest importance to the showyard as a means of promoting his breed, and of the two oxen which he exhibited in 1829, one was afterwards exhibited at the London Smithfield Show. Another entry which he sent forward to Perth was a heifer which, at the request of the Highland Society, was also displayed at Smithfield, in order to show to what excellence the Scottish Polled breed might be brought. Thus at the end of twenty-one years of persistent effort, Mr Watson received striking acknowledgment of the success of his work; and though he was yet to accomplish much on behalf of the breed before the dispersion of his herd in 1860 (he died in 1865), this may form a fitting point at which to consider other steps which were being taken in co-operation with him for the improvement of the cattle of the old territory of Angus and adjacent districts.

The name of Mr Alex. Bowie, Mains of Kelly, also stands out prominently in the pioneer days of breed improvement. His father started a herd of Aberdeen-Angus cattle in 1809, the year after Hugh Watson had started operations at Keillor, though it was a good few years later before it took a leading place. In this old herd were produced some of the most famous of the early sires of the breed, supplying as it did "Hanton" to the Tillyfour herd, and "Cupbearer" to the herd of the Earl of Southesk, at that other very ancient centre of Aberdeen-Angus breeding, Kinnaird. When it is recalled that "Hanton" was the sire of "Pride of Aberdeen," and "Cupbearer" the sire of "Erica," and that these are the foundation names in two of the most famous tribes of the breed at the present day, it will be seen that the contribution to the early history of the breed made by the Mains of Kelly herd was substantial and far-reaching. In his herd were founded several well-known families which are held in repute at the present day, though he, like the great majority of the breeders in Forfarshire, was very badly hit by the ravages of pleuro-pneumonia, which, about 1865-67, completely annihilated so many of the old herds, such as those at Kinnaird Castle; at Mains of Ardovie (Wm. Fullerton, 1810-80), to whose herd Mr M'Combie was indebted for his best stock in the female line; at Balwyllo, where Mr Robert Scott prior to 1846 had accomplished much good work on behalf of the breed. Nor must we omit to make mention of the very real services rendered in the cause of breed improvement by Lord Panmure

(1771-1852). The prominence which is usually given to the work of Hugh Watson, the first great improver of the breed on systematic lines, is often allowed to overshadow the efforts put forth by his lordship, but by his example he stimulated many in his locality to give attention to cattle improvement; and through the medium of the East Forfarshire Farming Association, of which he was elected the perpetual President, Lord Panmure was able to greatly develop interest in the breeding of the native cattle of the county, these being the only kind for which prizes were provided at the annual competitions on Trinity Muir. In the space at disposal, however, it is not possible to note the many contributions which were made towards the starting of the life-story of the Aberdeen-Angus breed, though mention should be made of the herd at Aldbar as one of the few links which still remain with the pre-improvement times of the cattle of Angus, Mr Chalmers' family of Nells of Aldbar having been, it is believed, bred on the farm from 1780 at least. Farther up the Vale of Strathmore, in the county of Kincardine, Mr Robert Walker, Portlethen, founded a herd in 1818, which is still in existence.

Fig. 3.—"Legend" 16,518 (four years old). Bred and owned by the late Colonel George Smith Grant, Auchorachan, Glenlivet.

First Prize Cow at Highland Society's Show at Aberdeen, 1894

WORK AT TILLYFOUR.

The outstanding figure in the founding of the Aberdeen-Angus breed is without doubt that of Mr Wm. M'Combie, Tillyfour (1805-80). Of the handful of far-seeing breeders who grasped the full significance of the craze for crossing which followed the introduction of the Improved Shorthorn into the cattle-raising districts of the North of Scotland, and who recognised the danger that threatened the native race of Polled cattle, none took up so prominent a stand as Mr M'Combie, who may well be described as the "deliverer" of the Aberdeen-Angus cattle. By the year 1829, when he became tenant of the farm of Tillyfour—to which later on several large adjoining farms were added in his operations as a breeder—the Shorthorn breed had begun to take a firm hold in the North. Recognising the risk that the native breed in its unimproved state ran of complete extinction, and being convinced that if their qualities were properly brought out they would equal, if not surpass, any other breed, Mr M'Combie resolved—to quote his own words—that "I would endeavour to improve our native cattle." With this fixed aim in view, he gave up the trade in lean cattle, in which he had been a very extensive participator, and turned the whole energy of his forceful and determined character, first to the rescue and then to the improvement of the breed. From the time that he won his first prize at a local show at Alford in 1832 to the crowning success at Paris in 1878, Mr M'Combie's achievements on behalf of Aberdeen-Angus cattle furnish a record which is perhaps unprecedented in point of brilliancy. He found a breed of a purely local nature, hemmed in by economic conditions and want of transport facilities to that circumscribed geographical area where it had existed as a local race for successive centuries, and in the short space of one half-century he raised the breed from this localised standard to a position of national and of international importance.

In tracing even briefly the work which Mr M'Combie accomplished in connection with the founding and improving of the Aberdeen-Angus breed, it has to be noted that, like Hugh Watson, Keillor, he started work with such material as he could find at hand. The greatest cattle-dealers in the North in those days were the brothers Williamson, St John's Wells, Fyvie, who generally sold about eight thousand head of cattle yearly in the markets of the South. They had a decided preference for the native "unmixed" Polled breed of Aberdeenshire, and it was from them that Mr M'Combie secured not a few of his best Polled animals. George Williamson, it may be noted, died in 1823, aged seventy-five years, and in the churchyard of Fyvie there is a monument erected to his memory by the Aberdeenshire Agricultural Association, "as a mark of respect for his upright and honourable conduct in private and public life, and in testimony of the great benefit derived by the county of Aberdeen from his meritorious exertions as an eminent cattle dealer for upwards of fifty years." In maintaining the reputation of the native race—the forerunners of the Aberdeen-Angus breed—the Messrs Williamson accomplished work of lasting importance, and no doubt did much in laying those foundations upon which others, at a later date, were to build. It was accordingly very natural that Mr M'Combie should find some of his earliest stock at St John's Wells, but his practice must have been to secure the best individual animals he could. Thus the cow that was first at the Aberdeen Highland in 1847, bred by Mr M'Combie, though exhibited by Mr Scott, Balwyllo, had for dam what Mr M'Combie described as "the first female of note at Tillyfour." She was bred by Mr Wilson, Netherton, in the adjoining parish of Clatt.

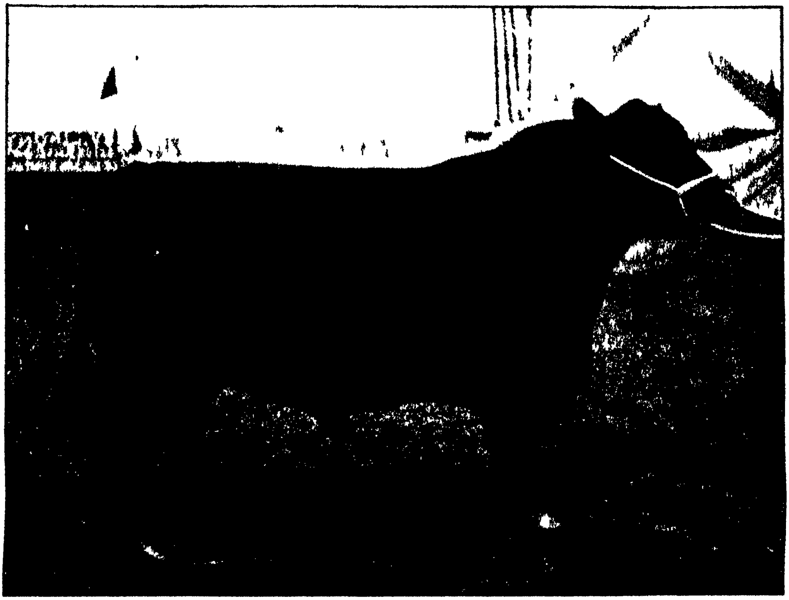


Fig. 4 —"Elate" 16,513 (three years old). Bred by Mr Arthur Eggington, South Ella, Hull; owned by Mr J. J. Cridlan, of Maisemore Park.

First and Breed Champion at Highland Show at Aberdeen, and at Royal at Carlisle, 1902.

Though the Tillyfour herd dates from about 1830, the first few years of its existence were devoted to working upon old local strains to a very great extent, and the purchase in

1844 of the cow "Queen Mother" at the Ardovie sale (Wm. Fullerton), inaugurated a new era not only in the history of the Tillyfour herd, but in the history of the Improved breed. Mr M'Combie has himself put on record the fact that it was to Mr Fullerton that he owed his success as a breeder, adding, "I shall always look up to him as the founder of my stock." It does not fall within the scope of this article to trace the remarkable system of in-and-in breeding which Mr M'Combie practised in developing his type, but tabulated pedigrees of some of the foundation cows of Mr M'Combie's herd form interesting commentaries on the lines of breeding followed in the evolution of what was to all intents and purposes a new breed.

BALLINDALLOCH INFLUENCE.

There is another name which must be mentioned in connection with the early work of breed improvement—that of Sir George Macpherson-Grant, Bart., of Ballindalloch, who died in December 1907, and who for a space of close on half a century took a leading part in the improvement of the breed; for if Hugh Watson may be termed the founder of the breed, and Wm. M'Combie the emancipator of the breed, the late Sir George Macpherson-Grant may equally be termed the refiner of the breed. By common consent he built up what was acknowledged to be the premier herd of the breed, and during its long and honourable existence the Ballindalloch herd has contributed more to the history of the Aberdeen-Angus breed throughout the world than any other herd. The show-yard successes won have been phenonemal, and such was the system of breeding followed to concentrate and intensify certain lines of pedigree that Ballindalloch became the recognised Warlaby of the Aberdeen-Angus breed, and as such has exercised an influence equalled by no other herd on the general upbuilding of the leading herds of the present day. Though details cannot be entered into here, it would be wellnigh impossible to exaggerate the far-reaching effects on the breed of the scientific system of refining which it underwent under the directing ægis of the late Sir George Macpherson-Grant.

There is no record of a time when there were not black Polled cattle at Ballindalloch, but it was not till 1861, when Sir George Macpherson-Grant came to reside there, that the real foundation of the present-day herd was laid. Purchases, which by their after-results may truly be termed epoch-making, were made, such as "Erica" from the Earl of Southesk in 1861, "Jilt" from Mr M'Combie in 1867, "Kindness" from Mr Skinner, Drumin, in 1873, "Pride of Mulben" from the Mulben herd in 1876, "Rose 3rd" from Westertown, "Blackbird of Corskie 3rd," "Miss Burgess," and "Georgina"—all of which were early additions to the herd. These, and others which might be mentioned, will be recognised by breeders as the foundresses of families of the breed, which are held in the highest estimation wherever Aberdeen-Angus cattle are bred.

ESTABLISHING HERD BOOK.

We shall have occasion to refer further to the work of Mr Wm. M'Combie, Sir George Macpherson-Grant, Bart. and others on behalf of the development of the breed, but there may, at this stage, be recalled that about 1840 the work of collecting the material for the first volume of the 'Herd Book' had been begun by Mr Edward Ravenscroft. The fruits of a decade of work were destroyed by the fire in the Museum of the Highland Society Offices, and though the work was recommenced in 1857 it was not till 1862 that there was issued the first volume of the 'Herd Book,' which contained 1183 entries by some eighty owners. In the preface special mention is made of the assistance given by the Earl of Southesk, Sir John Stuart Forbes, Bart., the Hon. Charles Carnegie,

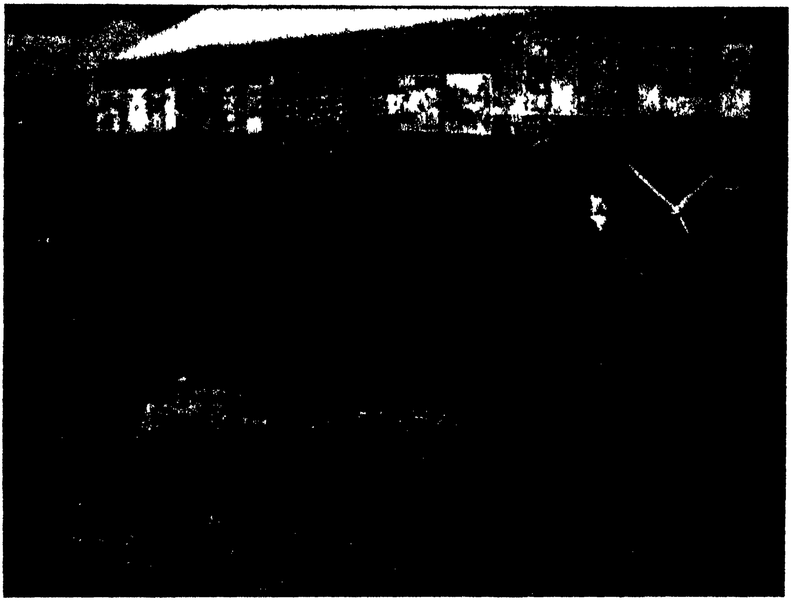


Fig. 5. —"Juana Erica" 36,285 (three years old). Bred by Countess Dowager of Seafield; owned by Mr J. E. Kerr, of Harviestoun Castle, Dollar.

First and Breed Champion at Highland Show at Peebles, and at Royal Dublin, 1906.

Mr Alex. Bowie, Mr Wm. Fullerton, and Mr Robert Walker—names which will for ever be associated with the early improvement of the Aberdeen and Angus breed of Polled cattle. Shortly after this there passed over the Angus country that terrible visitation of rinderpest, which swept so many of the leading herds almost completely out of existence, and it was little wonder, in face of the many discouraging difficulties that had to be encountered, that it was not till 1871 that a meeting of breeders took steps for the issue of a second volume. In 1879 the Aberdeen-Angus Cattle Society was formed, and the 'Herd Book' has now reached Volume 45.

DEVELOPING THE BREED.

Having referred thus briefly to the work of a few of those who contributed to the establishment of the breed, there may now be noted the steps taken for its development. There has been quoted in Mr M'Combie's own words the aim with which he took up the breeding of the native cattle of Aberdeenshire. The late Sir George Macpherson-Grant, in quite as definite terms, showed that it was with a very definite end in view that he took up the breeding of Aberdeen-Angus cattle. He has left it on record that about the end of the 'fifties and beginning of the 'sixties, it was not easy to get the Polls to the front, but "some of us were determined to do what we could. It was a hard fight." It is only when we realise what these men did accomplish that we are able—even though then only in part—to appreciate the greatness of the task to which they thus, with fixity of purpose, set themselves.

Aberdeen-Angus breeders, from very early times, have been good supporters of the show system, and it has been by taking every advantage of that system that most of the breed development has been brought about. As early as 1829 we find Hugh Watson exhibiting Polled cattle at a Highland Show, though it was not till 1848 that a separate section was provided at these shows for animals of the Aberdeen-Angus; and even yet it may be noted that it is only by contributing a subsidy to the prize fund of the Royal Agricultural Society of England that the breed is able to secure at Royal English shows a full classification of six classes. Early in the 'forties we find Mr Watson an exhibitor at the Irish shows, but it was when the mantle of Keillor fell on the shoulders of the owners of the Tillyfour and Ballindalloch herds that the greatest progress was made by way of the showyard rings, and that there were reached those points of excellence in fat-stock show circles which established the pre-eminence of the breed in beef production, to which reference will be made later on. From the very first, success attended their efforts so far as the improvement of the breed was concerned. So much was this the case that in 1852, when the leading exhibits were from Keillor, Mains of Kelly, Craigo, Tillyfour, and Balwyllo, the Directors of the Highland drew special notice to the section, recording that they "rejoice that this and preceding shows indicate a praiseworthy amount of effort and care on the part of breeders of Polled stock, followed by a corresponding improvement in the stock. They cannot but regard it as the most valuable breed of Scotland, combining as it does in a great measure the constitution of the Highlander with the feeding properties of the Shorthorn." It is worthy of note that this show of 1852 was the last time Mr Watson's name appears on the list of exhibitors, and the first time that Mr M'Combie figures first for breeding cattle bred and owned by himself. It is an interesting coincidence that it was under these circumstances that the Directors passed their gratifying comment on the progress that was being made in the improvement of Aberdeen-Angus cattle.

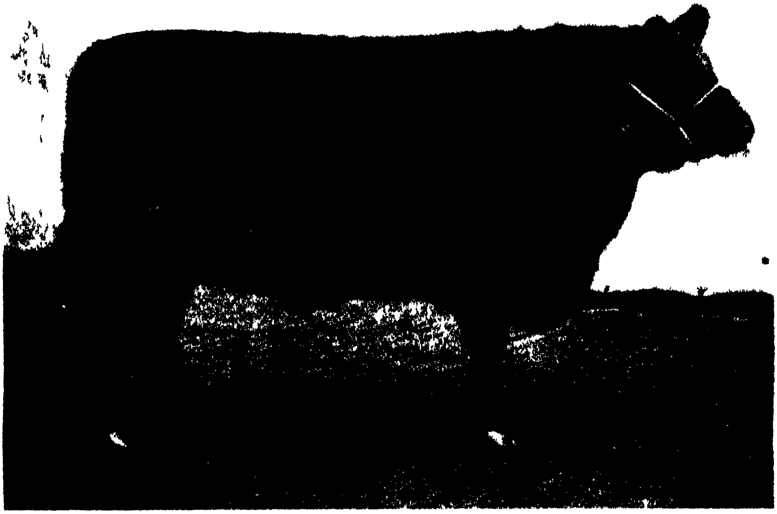


Fig. 6.—"MINA OF GLAMIS" 22,408. Bred and owned by the Earl of Strathmore.

Champion of Birmingham and Smithfield Fat Stock Shows in 1890, weight, at under three years, 16 cwt. 10 lb.

Not only was improvement being effected, but the interests of the breed were during these years marked by a steady progress at home. When it is recalled that the main railway systems of Scotland date only from 1845, and that it was not until 1854 that there was any railway transport to the north of Aberdeen, it will be seen that breeders in the North of Scotland were greatly handicapped in their efforts to reach new markets. Even in 1876 there were not more than half a dozen herds of the breed either in England or in Ireland, while, according to the latest volume of the 'Herd Book' (Vol. 45, published in March 1921) the entries show 326 herds in Scotland, 76 in England, and 132 in Ireland.

French Exhibition Successes.

It was, however, when the early breeders could get further afield that they were able to do the most far-reaching development work for the breed; and while home interests were advanced by repeated successes at Birmingham and London Smithfield shows, it was perhaps the brilliant record of the breed at the French International shows that contributed more than anything else to the spread of the breed, and certainly to its introduction into new countries. At the Exhibition of 1856, exhibitors included Mr M'Combie, Mr Watson, Mr Walker, Lord Southesk, Sir George Macpherson-Grant, Mr Bowie, and Mr Scott. Then at the International of 1857, when for the first time a section was provided for fat stock, Mr M'Combie was very successful, showing one ox—the heaviest of the British exhibits—which weighed 2744 pounds. In 1862 Mr M'Combie secured the *Prix d'Honneur* for the best animal of any breed, French or British—a happy accompaniment to the issue of the first volume of the 'Herd Book' for the breed. The winning of this, the fat-stock championship of the world, was followed in 1878 by an event the importance of which cannot be exaggerated, as giving impetus to the growing interest that was being taken in the breed. On the occasion of the International of that year a prize was offered by the French Government for the best animals for breeding purposes bred by exhibitors in the sections for cattle other than French. Seventeen distinct breeds competed for the trophy, and in this great world-wide contest the winners were a group from the Tillyfour herd, while reserve to them was a group from the herd of Sir George Macpherson-Grant. Greater even were the honours which were that day to be showered upon the Aberdeen-Angus breed, for when it came to the competition for the best group of beef-producing animals—the only contest in which British and French cattle had an opportunity of testing their respective merits—the Blackskins from Tillyfour again triumphed.

When it is recalled that the first public sale of the breed took place in 1841 (when that Hubback of the breed, "Panmure" 51, was acquired from his breeder, Lord Panmure, at seventeen guineas!); that it was only in 1844 that Mr M'Combie really laid the foundation of his fame as a breeder by the purchase of Mr Fullerton's "Queen Mother" 348; and that it was only in 1861 that Sir George Macpherson-Grant made the initial purchases of the modern Ballindalloch herd, it will be acknowledged that great indeed had been the work accomplished for the breed.

In less than fifty years from the time that Mr M'Combie put his master hand to the work of evolving order and definite type out of the raw and rough material represented by the native cattle of his native county, he and his fellow-workers in the same great cause had raised the breed to a position that demanded recognition by virtue of demonstrated merit in every corner of the cattle-raising world.

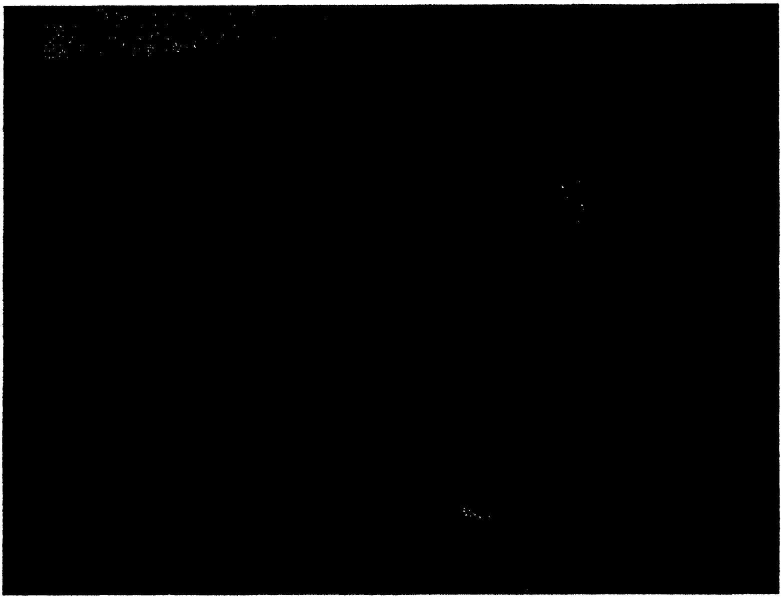


Fig. 7.—"Everwise" 24,436 (four years old). Bred and owned by Mr J. J. Cridlan, of Maisemore Park.

First and Breed Champion at Highland Show at Stirling and at Royal at Gloucester, 1909

It is from this epoch in the breed's history that there takes origin the history of the breed in many other lands, and there may accordingly at this point be taken up briefly the spread of the breed abroad to those other countries where it has come to occupy a prominent place amongst the other though older-established breeds, noting only in passing that it was in 1879, the year after the "Triumph of Paris," that there was formed the Aberdeen-Angus Cattle Society, which in the first year of its existence had a membership of fifty-six, a number that in the intervening forty years has increased to over six hundred.

THE BREED IN NORTH AMERICA.

In no country more than in the United States of America have Aberdeen-Angus cattle made greater progress, or come to fill so large a place among the cattle breeds. This development of the breed has a very distinct connection with the growth in the interests of the breed at home, for there is nothing so bracing to the welfare of any breed as a good export demand. Such a demand was experienced in the case of Aberdeen-Angus in the late 'seventies and early 'eighties, this being indeed the only real " boom " which has affected the breed to any very marked extent, though all along a fairly good export trade has been experienced. For almost a quarter of a century the Shorthorn and other earlier-improved breeds had enjoyed a firm footing on the American market ere the Aberdeen-Angus began to make its appearance, but the progress made by the breed was quite phenomenal. It was in 1873 that the first importation of Aberdeen-Angus bulls was made with the express purpose of improving the range cattle, but it was after the great victories of the breed at the French Exhibition in 1878 that the breed was seriously taken up in the United States. Indeed, it was in "M'Combie's Year" that the first pure-bred herd of Aberdeen-Angus cattle was established in that country. In the succeeding few years very large shipments were made by several exporters —between 1880 and 1883 it has been estimated that about two thousand head were imported—and the transactions carried out about this time included the outright purchase of whole herds of the breed. It is questionable whether such a " boom " as was then experienced is without drawbacks to the best interests of any breed, and it is to be feared that some of the exporters, in their enthusiasm for business, were not just so careful as they ought to have been for the ultimate welfare of the breed both in the United States and in Canada—the result being a very decided falling off in the demand for cattle of the breed, though happily of more recent years there has been renewed activity and very marked progress in Aberdeen-Angus circles in both countries.

The secret of the remarkable progress of the breed in a comparatively brief period is to be found in its strikingly uniform successes at the leading Fat Stock shows, and at the ordinary auction sales of butchers' cattle. It has been as a beef producer *par excellence* that the breed has prospered both at home and abroad, but nowhere has the progress been more marked than in the States, which provided so extensive a field for inter-breed comparisons and competitions. It is of interest to note that the first appearance of an Aberdeen-Angus steer in an American fat stock show was in 1883, when Messrs Geary, who did so much for the breed in its early days in America, imported the Aberdeenshire-bred "Black Prince," bred by Mr Maitland, Balhalgardy, and exhibited it with great success and with far-reaching results. The true opportunity for the breed came, however, in 1900, with the institution of the International Exhibitions at Chicago; and through the medium of these large and representative shows the breed has built up for itself a record in connection with beef production which is without parallel in the history of any other breed of cattle in any part of the world. This record will fall to be dealt with when something is being said of the Fat Stock show successes of the breed.

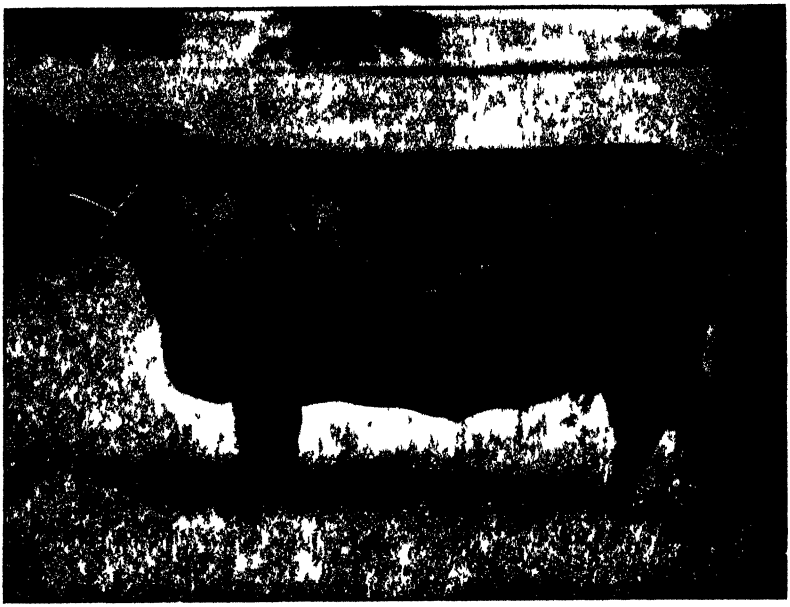


Fig 8. "Elroto" 39,206 (three years old) Bred and owned by Mr James Kennedy, of Doonholm, Ayr

First in Class and Female Champion of the Breed at Highland Show at Aberdeen, and at Royal at Newcastle on Tyne, 1908

The official birth of the Aberdeen-Angus breed as an American live-stock factor may be placed at 1883, for in that year the American Aberdeen-Angus Breeders' Association was formed; and since that date over 300,000 animals have been recorded in the 'Herd Book,' while the membership is round about 6000. Within the past few years great activity has been shown in breed circles, and by the appointment of Field Officers, extension work of a valuable kind has been accomplished, while a publicity and propaganda campaign has been vigorously carried on. In this connection mention should be made of the work in connection with the formation of calf clubs for the boys and girls. These clubs are exercising great and beneficial influences, and are bound to have equally great and beneficial results.

To Canada belongs the credit of owning the first breeding herd of Aberdeen-Angus cattle to be established on American soil, Professor Brown of the Ontario Experimental Farm at Guelph importing in 1876 a small herd, which formed the nucleus of the breed in Canada. In the leading shows of Western Canada, and especially at Brandon, a great record of wins for the breed has been established. There are not nearly so many breeders of Aberdeen-Angus cattle east of the Great Lakes as there are west, though a good many years ago this was the only part of the country in which Aberdeen-Angus cattle were to be found. The early set-back has not been easily recovered, but within the past few years the fortunes of the breed have been clearly in the ascendant. Within the last year or so the affairs of the breed have been placed on a firmer basis by the appointment of a whole-time permanent secretary, under whose direction very substantial progress is being made.

PROGRESS IN ARGENTINA.

It was about 1876 that the first Aberdeen-Angus bull was introduced into the Argentine. Between that year and 1884 quite a number of bulls were shipped to the same country, and the experiments made in crossing the native "Criollo" cows with these bulls of so pronounced a beef breed were watched with close interest. It has to be stated, however, that those carrying on this export trade were rather unfair to the breed, the vast majority of the specimens exported being of an inferior and cheap type. Needless to say, the results were disappointing, and great harm was done to the interests of the breed—so much so that a distinct prejudice was set up against the breed, and indeed against black cattle generally. The breaking down of this prejudice is proving no easy task, and in the interval other beef breeds have come to secure a firm holding in most of the best cattle divisions of South America. About 1895, however, something in the shape of a new start for the breed was made, and a 'Herd Book' for the breed was opened by the Sociedad Rural, in whose hands the compilation of the 'Herd Book' still remains. Progress was, however, slow, and it was not till

1902 that the first show of the breed was held in connection with the Palermo shows of the Rural Society. Within the last ten years the interests of the breed have forged ahead, and now there are well over one hundred herds of registered Aberdeen-Angus cattle in Argentina, while the proportion of Black Polled grades is steadily increasing. The formation in 1917 of the Aberdeen-Angus Breeders' Association was followed in 1920 by the formation of another society of breeders, and both organisations are carrying on active work on behalf of the breed. The very satisfactory results of representatives of the breed at the carcase competitions held in connection with the Rural Society's Fat Stock Shows have assisted greatly in its development, and the favour shown by packing houses for the type of steer secured by the Aberdeen-Angus cross is opening up what will apparently be a very large market for Aberdeen-Angus cattle. Of recent years some of the best bulls of the breed have been shipped for herds in Argentina, and at the shows of the Rural Society the breed is now strongly represented, while much more attention is being given to this market by the regular exporters of pedigree cattle.

Fig. 9.—"PRINCE BLUE BLOOD OF BALLINDALLOCH" 29,807 (three years old). Bred by Sir John Macpherson-Grant, Bart., of Ballindalloch; owned by Mr D. Y. Stewart, Carse of Trowan, Crieff.

First Prize at Highland Show at Cupar, and First and Breed Champion at Royal Dublin, 1912.

SOUTH AFRICA AND AUSTRALASIA.

Another country which is providing an ever-expanding market for Aberdeen-Angus cattle is South Africa: indeed, within the last half-dozen years that country has been the most extensive customer for British breeders of Aberdeen-Angus cattle, though of late, owing partly to economic conditions in South Africa and to unpopular and inconvenient conditions of export in this country, business has fallen off considerably. Many of the large ranching concerns, such as the British South African Company, the Liebig Company, and many others, have gone in extensively for Aberdeen-Angus cattle, and the appearances of the breed at the Fat Stock shows have also contributed to its steadily growing popularity. The 'Herd Book,' of which over a dozen volumes have been issued, is taken in hand by the South African Stud Book Association, established in 1907, and in 1917 there was formed the Aberdeen-Angus Breeders' Society of South Africa. In tracing the history of the breed in South Africa, it will be noted that though at first rather poor prices were paid for such representatives of the breed as were imported, the breeders there are now offering for some of the best of the breed. Another significant fact is that during the year 1919-20 more Aberdeen-Angus cattle were registered than during the preceding fourteen years.

It will not be necessary to follow in detail the various migrations of the breed from the home haunts in North-East Scotland to new homes beyond the seas, but in dealing with this phase of the breed's history, mention must be made ot New Zealand and Australia. Even before the fame of the Black Polls had been proclaimed far and wide as the result of the sweeping victories at the French International Show in 1878, the Aberdeen-Angus breed had made its appearance in New Zealand. There is record of a shipment in 1863, but it was not until the late 'eighties and the early 'nineties that there was very marked progress. In 1914 one of the leading sales realised an average of only 15 to 25 guineas for females, while bulls made up to 50 guineas. This was about the turning-point in the breed's career in New Zealand, for there was a steady improvement after that, and in 1917 at one sale 156 cattle from a single herd made an average of 94½ guineas, with top prices of 510 guineas for a bull and 375 guineas for a cow. That same year the New Zealand Aberdeen-Angus Breeders' Association was formed, and, with an ever-expanding outlet for surplus stock in Australia, the number of herds in New Zealand has since then received substantial augmentation, and several important consignments have been imported from this country.

Fat Stock Show Successes.

It was to the "verdict of the butcher's block" that Mr M'Combie appealed when he set about striving for the emancipation of the breed from its localised birthplace, and it has been in conformity to that verdict that the breed has prospered at home and abroad. Much might be written of the intricacies of breeding, of names of animals which have become famous in the annals of the breed, of individual herds which exercised far-reaching influences on the general welfare of the breed; but the spread of the breed and its success in the many lands to which it has gone within the past half-century must be attributed principally to the utilitarian qualities displayed by the breed in its mission of beef production. Though the Smithfield championship had been won by Mr M'Combie as early as 1867—after he had competed for it eight times—it was not till 1891 that a separate section was provided for the breed. Since that time Aberdeen-Angus cattle have taken a leading place at this the greatest of the British Fat Stock Shows, and over the

Fig. 10.—"Escalad of Bleaton" 48,058. Bred by Messrs Marshall & Mitchell, Bleaton, Blairgowrie.

Sold at Perth, February 1921, to Mr W. G. Macbeth of Dunira, Comrie, at 3000 guineas.

last twenty-six shows it has won the championship over all other breeds upon no fewer than fourteen occasions. It has also been very successful in the carcase competitions, and in those contests which more clearly demonstrate the qualities of early maturity it has taken a leading place. At the other Fat Stock shows throughout the country the record has been equally outstanding, and in the ordinary markets for commercial cattle the Aberdeen-Angus and its black or blue-grey crosses have long occupied a pre-eminent position in the estimation of all connected with the meat trade. But the brightest page of the beef history of the Aberdeen-Angus cattle is provided by the results of the great inter-breed competitions, held in connection with the Chicago International Shows. Indeed, the great opportunity for the breed came in 1900 with the establishment of the International Shows, which gave scope for comparisons on a larger scale than possible in any other country as to the merits of the different breeds in regard to beef production There is no desire to pit one breed against another in these notes, but it is only by the application of comparisons that there can be brought out the marvellous record of the breed. Mr M'Combie, when he put his hand forth for the improvement of the breed, put it on record: "I was led to believe that if the properties of our Polled cattle were properly brought out, they would equal, if not surpass, any other breed as to weight, symmetry, and quality of flesh. I resolved that I would endeavour to improve our native breed." The improvement of that breed was carried out with the aid of many stepping-stones—Birmingham, Smithfield, the French Exhibitions, and the many shows of breeding stock—but chief amongst all agencies which have contributed to the growth of the Aberdeen-Angus breed, and have justified the claim of the late Mr M'Combie for breed supremacy in beef production, have been the shows at Chicago. Over the nineteen shows the grand championship for single steers has been won twelve times by Aberdeen-Angus, three times by Herefords, twice by Shorthorns, and twice by a cross-bred. In the car-loads there have been fifteen Aberdeen-Angus grand championships, with three for Herefords, and one for Shorthorns; while in the carcase competition every champion-winning animal over the nineteen shows has, with one exception, been of Aberdeen-Angus breeding. Taking all the inter-breed competitions at Chicago since 1900, it is found that the Aberdeen-Angus claim fifty-seven grand championships, Herefords eight, Shorthorns six, and cross-breds three. These figures are quoted simply to show how the breed compares in important aspects with those other breeds whose establishment in America is traceable to a much earlier date.

CONTRIBUTING FACTORS.

Just as three names stand out prominently in the early history of Aberdeen-Angus cattle, so three events in its history mark distinct epochs—the initial purchases by Hugh Watson on Trinity Muir, the winning of the Smithfield championship by Mr M'Combie, and the success of the breed at the French International in 1878. The first event gave point and direction to efforts at improvement all over the North-East; the second proved what the breed could do in the keenest of competition with older-established breeds for the honours in beef production, and had as a direct outcome the establishment of a herd on the Royal farm in Scotland, and the granting of Royal patronage to the Society that was established to foster the interests of the breed; while the third event caused the echoes of the breed's victories to be heard all over the cattle-raising world, preparing for it new homes in far-off lands, where neither the ravages of drought, the colds of the sub-Arctic regions, nor the heat of the subtropical countries seem to stand in the way of the steady progress of the breed.

The more wide the breed's distribution, and the more varied the conditions to which it was subjected, the more clearly were there brought out those inherent qualities of hardiness, vigour of constitution, prepotency, and early maturity, which are so outstanding characteristics of the breed. Though possessing valuable dairy qualities, it has been through the ever-widening recognition of the merits of the breed in beef production that Aberdeen-Angus cattle have increased the number of their patrons. Alike as store cattle for the feeders and by the retail butchers, the breed has always been held in the highest repute. In regard to early maturity, it is interesting to note that the breed was the first to supply a two-year-old champion at the London Smithfield Show, and is the only pure breed to supply a yearling champion at the Scottish Fat Stock Show.

The breed possesses valuable crossing qualities, and this has also been an important factor in its extension both at home and abroad. The "grades" of the breed came early to be known in American market parlance as the "Market Toppers," just as the breed itself, on account of market performances in that great cattle country, was styled "the breed that beats the record." In the home markets great preference has long been shown by meat salesmen for cattle of the Aberdeen-Angus type, and it has been these utilitarian qualities that have tided the breed over many a dull day when its fortunes were at a low ebb.

Much could be written of the extent to which the breed, when used for crossing purposes, imparts its peculiar properties of hornlessness and beef supremacy to its offspring, but it may be sufficient to instance the fact that the Smithfield champion of 1919—the first and only occasion in the long history of these shows upon which a yearling won that honour—showed three parts of Aberdeen-Angus breeding.

SALES AND PRICES.

A great deal of the prosperity of any race of pedigree stock depends upon the extent of the export trade which it enjoys. The Aberdeen-Angus breed has not been favoured with that extensive and sustained export trade which has marked the history in recent years of certain other breeds, and this fact is reflected in the exceedingly slight fluctuation which marks values over a long series of years. One of the earliest sales of which we have a record was Mr M'Combie's first public sale in 1850, when the average was £20, 13s., and the top price £35. Thirty years later, when the Tillyfour herd came to be dispersed—namely, in 1880—the average for seventy head was £48, 1s. 6d., with a top price of £283, 10s., this being the highest individual price for an Aberdeen-Angus animal sold at any public sale up to that time. The American "boom" was then setting in—the only experience of the kind which the breed has had to hasten on its development. Large prices were then current, but the spurt was but short-lived, and it is questionable whether it did not do more harm than good to the general interests of the breed. Numbers were not then large enough to cope with the extraordinary demand, and at the same time to comply with conditions which would have conserved the best interests of the breed in the new countries to which it was going. A few years in the early 'eighties saw a very active export trade to the United States and Canada—one of the most successful sales of that period being the disposal of the Earl of Airlie's herd in 1882, when there was an average of £108, 11s. 6d., with a top price of £525.

With the passing of this demand, prices fell away to a very marked extent, the market being almost exclusively a "home" one. Values of the year's public sales represented averages of from £17 to £22, and the wonder is that the breed did not suffer to a greater extent than it did, in view of the fact that certain other beef breeds, which were finding an extensive foreign outlet, were steadily rising in monetary value. During the last ten years or so, however, Aberdeen-Angus breeders have had the satisfaction of experiencing a steadily-rising market. Prior to the war, prices were showing a distinct upward tendency, due to the growing popularity of the breed in Argentina and in South Africa. Then, since the completion of the war, there has been evident a keener interest in the breed in North America than has been the case for over forty years, and private transactions at very high figures have taken place for the sale of cattle of the breed for that country. The result of this widening out of the prospects of export trade may be found in the fact that, whereas the average in 1911 for public sales held throughout Scotland was £24, 1s. 6d., last year (1920) the average for 2073 animals of the breed publicly disposed of was £82, 16s. 9d. It is the case, of course, that national economic conditions have also had the effect of raising prices all round, but it is unquestionably the fact that to a very considerable extent the improvement in values of cattle of the Aberdeen-Angus breed can be traced to a growing appreciation of the breed in other countries, and notably in North and South America, Africa, and New Zealand.

As a matter of interest, it may be noted that the record price for an animal of the Aberdeen-Angus breed stands at £10,000, which was paid for a bull at Mr Kershaw's sale in Ohio in May of last year. So far as the public sales of this country are concerned, the record price is 3000 guineas, made both last year and this year for yearling bulls. Indeed—and just to show the long road along which the followers of the pioneer breeders have successfully guided the breed—it may be stated that the three highest priced animals at the spring sales of pedigree cattle in 1921 were of the Aberdeen-Angus breed. The record for a heifer calf of the breed, £315, still remains with the Cortachy sale of 1882, and for the other classes of the breed the records at public sale at present are: bulls, £3150; cows, £609 (or £756 for cow with young calf at foot); two-year-old heifers, £1050; and yearling heifers, £1365.

INSECT AND ARACHNID PESTS OF 1920.

By R. STEWART MACDOUGALL, M.A., D.Sc., F.R.S.E.,
Consulting Entomologist to the Society.

THE LARGE POPLAR LONGICORN (*Saperda carcharias*, L.)

THIS beetle, described in the books as rare, has been found in large numbers in certain areas in Aberdeenshire; its structure and life-history have just been the subject of a research in my laboratory by Dr Walter Ritchie, and I give here some of the main points of the work.

The beetle is a conspicuous one, measuring from just less than 1 inch to over 1 inch in length. In fresh specimens the black colour of the body is hidden by a complete covering of ash-grey or yellowish-grey or greenish-yellow pubescence. The antennæ are longer than the body (the male), or a little shorter than the body (the female). The wing-covers are broadest at the shoulders, and gradually become narrower to the apex.

The adult beetles bite pieces out of the leaves of poplar and willow. The females especially are destructive, as they gnaw away both outer bark and inner bast in patches here and there over the lower part of the stem, an egg being inserted at each gnawed place. Later, these wounds, confusable at first with lenticels, appear as cracks and fissures.

The larva is a legless grub, which, when full grown, may measure in length 1¼ inch. This grub is broadest just behind the head, and the body tapers gradually to the hind end; the segmentation of the body is very distinct, and the grub has a wrinkled appearance. The head carries two strong chitinised jaws, by means of which the wood is gnawed away. It is by the larva that the chief damage is done to the tree, for the bast and cambium and outermost wood are eaten, and then the wood is tunnelled in the longitudinal direction, and later, exit passages are gnawed to the outside.

Life-history.—After pairing, the females, in summer, eat out notches on the smooth-barked parts of the lower parts of the stems of poplar. After a notch has been eaten out, the female turns round, finds the notch, inserts her ovipositor, and introduces an egg. One egg is laid for each notch. In Dr Ritchie's observations and experiments, vigorously growing young trees from five up to twenty years of age were used for egg-laying. The larva, on hatching, eats out an irregular patch in the bast and cambium, and then tunnels for a short distance in the transverse direction into the sapwood; next, it turns downwards through the wood, obliquely, towards the centre of the stem; then the larva turns and, moving upwards, gnaws out a longitudinal gallery. Pupation takes place at the uppermost end of the tunnel. Before this longitudinal gallery is completed the larva turns now and again to eat out and complete an exit passage for the future adult. This exit passage runs horizontally to the outside of the stem, not far from the pupation end of the larval gallery. Pupation takes place at the upper end of the longitudinal gallery in a little chamber cut off from the rest of the gallery by a plug of material gnawed away from the sides of the gallery. When the resting stage has ended, the adult beetle eats through this plug, and making its way to the horizontal exit portion mentioned above, clears this out, makes it larger, and then issues into the open by a round flight hole. There are variations in the pattern of the larval gallery according to the thickness or thinness of the attacked stems, and according to whether the larvæ are overcrowded or have abundant room to work.

In Dr Ritchie's experiments the length of the life-cycle was about four years, the common thing being for the eggs laid in summer not to hatch until the succeeding spring.

THE ASH-BARK BEETLE (*Hylesinus fraxini*).

This beetle and examples of its work have been sent to me from Perthshire. The species is, especially in England, a well-known enemy of ash. The beetle measures in length $\frac{1}{10}$ inch and over: it is brownish or pitchy in colour, variegated with greyish scales, so that when examined with a hand-lens the beetle presents a patchy appearance; further, there are two dark-brown spots, one on each side, just in front of the wing-covers. The larvæ are legless grubs, at first somewhat purplish in colour, later yellowish-white; the front end is rather thicker, the larva tapering to the hind end. The head and jaws are chitinous, and brown in colour.

The brood galleries are very characteristic (Fig. 11). The female enters the bark and gnaws out a two-armed gallery; the two arms are equal in length, and run in the transverse direction. Where the beetle attacks a stem or pole and has room to work, the two arms are more or less in the same line, and measure from 2 inches to, it may be, almost 4 inches long; but in cases of overcrowding, and this is very common, or when branches are bored, there is great variation in the completed length of the two arms, and considerable irregularity as regards the lie of the arms (Fig. 12). Typically, the arms of the mother-gallery bite distinctly into the sapwood, but in thicker-barked parts the impression is stronger on the inside of the bark. Eggs are laid along each arm of the mother-tunnel, and the grubs, on hatching, gnaw out, each for itself, a tunnel. The larval tunnels run in the longitudinal direction, upwards and downwards from the mother-tunnel. These larval tunnels vary in length from 1 inch to 4 inches. The larvæ, when full fed, pupate in the bark if this be thick, or in the sapwood if the bark be thin, the beds for pupation being eaten out at the end of the larval tunnel.

When the pupal stage is over, the newly-developed young beetles eat their way to the outside, each by a separate opening, the exit holes looking like small shot holes (Fig. 13). These young beetles come away in late summer and early autumn, but they are not yet able to proceed to an efficient copulation, and the eggs are not ready. To accomplish their complete development and to prepare the eggs, a certain amount of feeding has to be done, and for this purpose the newly-issued beetles fly to the crowns of ash-trees, which they bore into, remaining there, or, it may be, in the lower thicker-barked parts, to pass the winter—*i.e.*, the beetles do not breed in the year of their exit from the pupal beds, but in the spring following their feeding and hibernation.

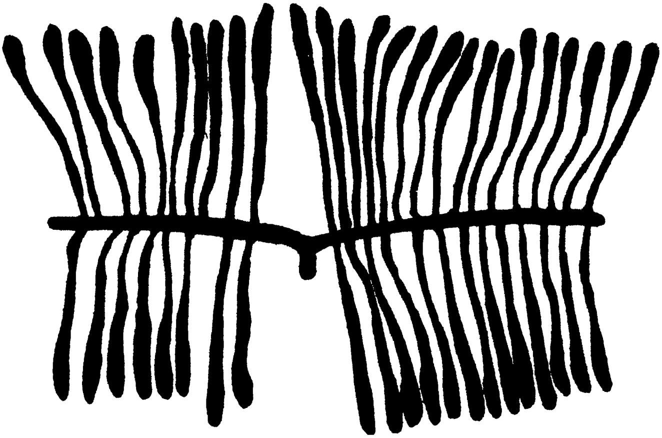


Fig. 11.—*Mother and larval galleries of* Hylesinus fraxini

Enlarged Drawn from nature.

The *H. fraxini* females, after making their galleries and laying their eggs, do not necessarily die, but they may live to proceed to a new pairing and egg-laying in freshly-made mother-galleries. They cannot do this without a period of rest and renewed feeding, for their previous boring and egg-laying have exhausted them. Such exhausted adult beetles come to the outside, and, just as described above for the newly-issued beetles, bore into the outer bark and bast of ash-trees. Whether these old *fraxini* adults will be able to rear a second brood in the same year will depend on whether they were developed early or late in the season, and also on the climate, locality, and food material.

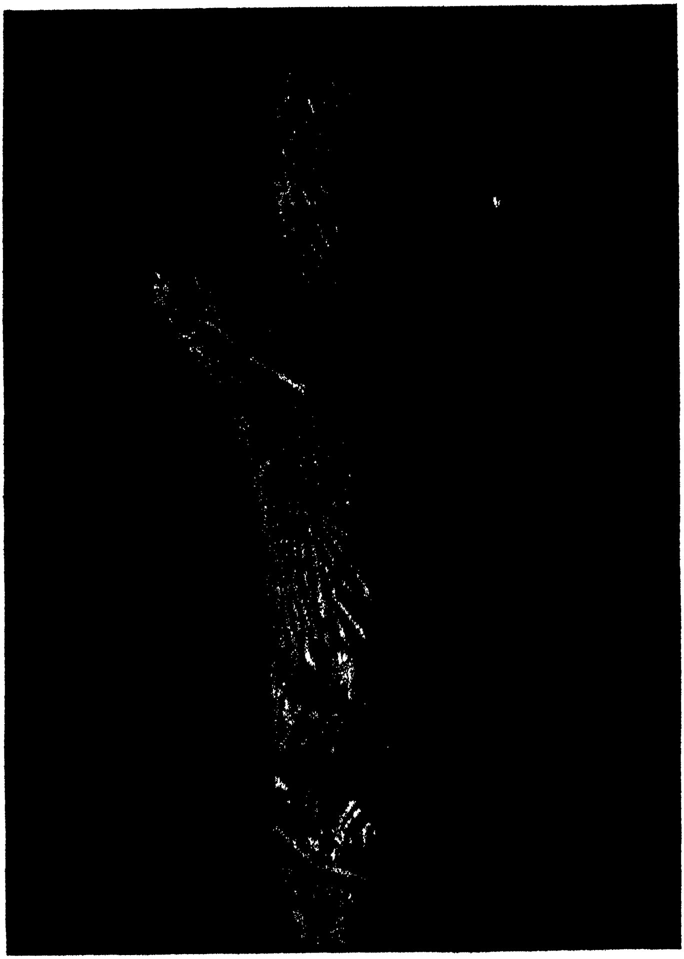


Fig. 12.—*Mother and larval galleries of* H. fraxini *on a branch.*

Natural size. From nature.

In fighting *H. fraxini*, inasmuch as the beetles instinctively choose out unhealthy trees for their brood galleries, care should be taken that ash be grown on suitable soil and in localities suited to it.

Infested trees or branches should be cut down, the branches containing the brood burned, and the stems barked.

Felled ash stems should not be allowed to lie for long unbarked, as these serve as breeding centres, from which hordes of *H. fraxini* (I have bred out from one large ash branch some thousands of *H. fraxini*) will issue and attack good standing trees. An overwhelming onset of these bark beetles on a sound tree can reduce it to a condition favourable for the beetles using such a tree for brood purposes.

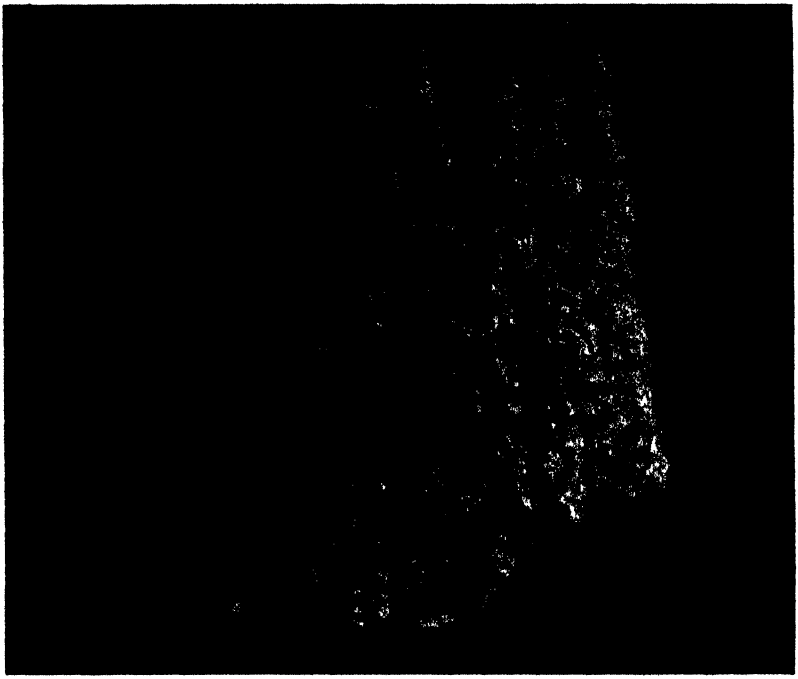


Fig. 13.—*Bark of Ash with flight-holes of* H. fraxini.
Natural size. From nature.

A sickly standing tree or a felled stem may be allowed to remain, say, till June, or later in the north, without being removed or barked. Such trees or stems are trap plants, which the beetles use for the laying of their eggs, and in June, at the time of destruction or barking of the traps, the developing brood is destroyed.

Another cause of loss from this enemy is the rotting of ash stems in the wood-yard, the bark being loosened in great patches owing to the destructive work of the beetles, with the consequent cracking of the exposed wood, and the entry of water and the spores of injurious fungi.

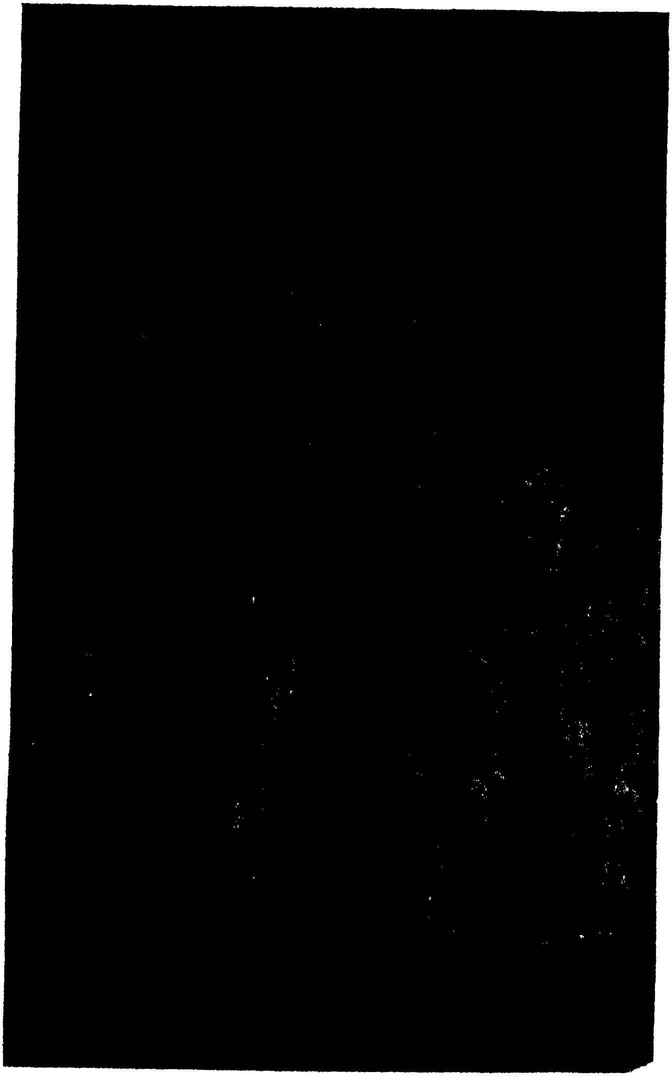


Fig. 14.—*Mother and larval galleries of* Hylesinus crenatus. From nature. Reduced.

There is another Ash-bark Beetle (*Hylesinus crenatus*) which has been sent to me from several counties. This beetle and its work (Fig. 14) can be distinguished from *H. fraxini* without great difficulty, for *H. crenatus* is larger, measuring in length from $\frac{1}{5}$ inch and over, and the beetle is black, without the abundant grey hairs of *fraxini*. Further, though the mother and larval galleries of *crenatus* have the same pattern as those of *fraxini*, the galleries of *crenatus* have a greater diameter: of the two arms of the mother-gallery one is shorter and one longer, and the larval galleries are very long and winding, especially where crenatus is not overcrowded.

THE SIX-TOOTHED BARK BORER OF THE SPRUCE (*Pityogenes* (*Tomicus*) *chalcographus*, L.)

This little beetle, believed to be scarce in Britain and very local in its distribution, may turn out—as with other forest insects considered rare until better knowledge and skilled intensive search proved them at least fairly common—to be not so rare. During the past summer this species was brought to me and sent to me from Perthshire, and on visiting the area I found both the beetle and its damage. The species is a very minute one, measuring at the most $\frac{1}{12}$-inch, and its recognition characters are more for the specialist. The damage, however, is not so difficult to determine, the pattern of the brood-galleries giving great help in this respect.

P. chalcographus is a polygamous species. A pairing chamber is made in the middle of the bast-layer of a spruce stem. Here mating takes place with four to eight females, each of which proceeds to gnaw a gallery for herself. Along each side of the gallery eggs are laid in little notches. The mother-galleries, four to eight in number—according to the actual number of females—run out in star-like fashion (Fig. 15), and it may be in a somewhat winding way from the central pairing chamber. These mother-tunnels show on the inside of the bast, and mark the sapwood, but not deeply. Typically, the position of the pairing chamber buried in the bast renders the pairing chamber invisible from the inside of the bast, and thus the mother-galleries, when examined from the inside of the bark, appear to arise separate from one another, not meeting centrally. The larval tunnels that run or wind from each mother-gallery are comparatively short, and are close to one another. Pupation takes place at the end of the larval gallery, the pupal beds being in the bark.

The larvæ are legless, with brown chitinous heads and jaws; the body is white-yellow, and is wrinkled; the front joints of the body are rather thicker than the hind ones.

P. chalcographus works especially on thin-barked parts of the tree. In unhealthy spruce it chooses the higher-up thin-barked parts of the stem, and also the branches. It is also found on suppressed young plants and on felled spruce. While spruce (*Picea excelsa*) is the typical host plant, there are Continental records on *Pinus sylvestris*, *Pinus cembra*, *Abies pectinata*, and *Larix Europœa*.

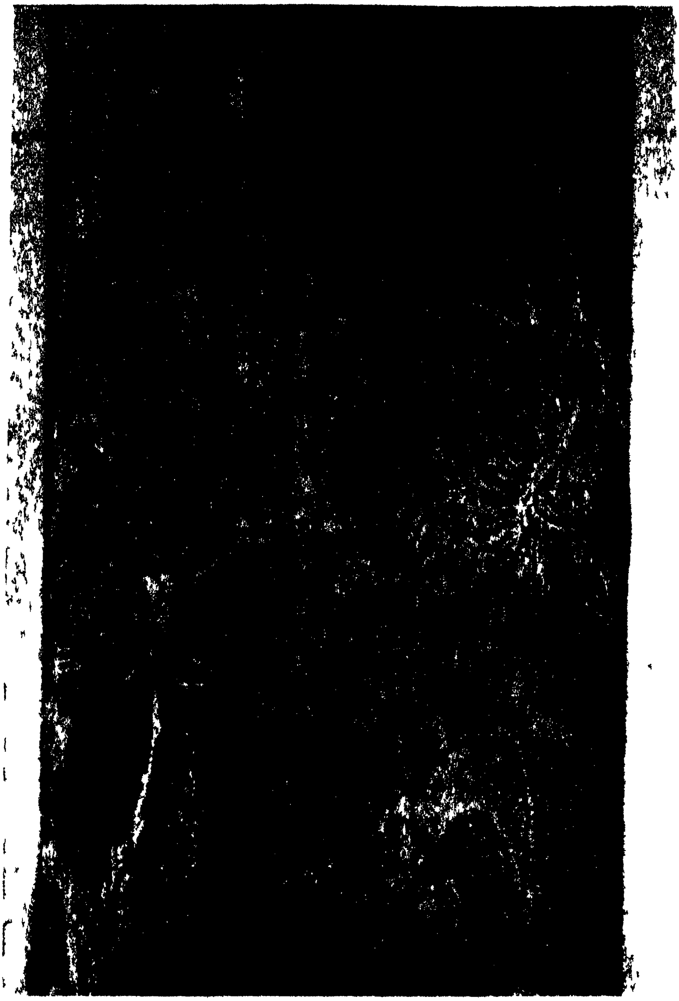


Fig 15.—*Star like mother-galleries, and larval galleries of* Pityogenes chalcographus.

Natural size. From nature.

Confusion may arise between *P. chalcographus* and the closely related *P. bidentatus*, the two-toothed pine beetle, a very abundant species, which, though chiefly limited to pine, is also to be found on spruce.

The adults may be distinguished thus :—

P. chalcographus.	*P. bidentatus.*
Smaller, $\frac{1}{14}$ to $\frac{1}{12}$ inch.	Larger, $\frac{1}{12}$ to $\frac{1}{10}$ inch.
Two-coloured, dark in front and pale behind.	All one colour, black or dark-brown.
The sides of the wing-covers smooth towards the apex.	The sides of the wing-covers have rows of punctures right to the apex.
The hind-end of the wing-covers of the male shows a furrow on each side of the suture and three teeth on each side of the furrow.	The hind-end of the wing-covers of the male shows a broad circular impression with a large somewhat curved or hook-like tooth on each side.
Hind-end of female as in male, but the three teeth are less prominent.	The hind-end of the female has a steep slope furrowed on each side of the suture, but there is no tooth.

As regards the pattern of the brood galleries, the two beetles may be distinguished thus :—

P. chalcographus.	*P. bidentatus.*
Polygamous.	Polygamous.
Mother-galleries radiate from the pairing chamber in a more or less star-like pattern	Mother-galleries radiate from the pairing chamber in a more or less star-like pattern.
Pairing chamber generally hidden in the bark, and the mother-galleries seem to arise quite separate from one another.	Pairing chamber visible on the outside of the wood and the inside of the bark, and the mother-galleries are seen to meet in it.
Mother- and larval-galleries mark but do not cut very distinctly into the outermost wood.	Mother- and larval-galleries cut into the outermost wood.
Larval galleries come away from each mother-gallery close to one another.	Larval-galleries come away from each mother-gallery, not close together but at some distance apart from one another.

Galls on Plants.

Certain plants, for example fungi, and many different kinds of animals, have the power of influencing the growth of the cells of the host plants, and so interfering with, and changing the processes of, nutrition and growth that malformations or swellings arise, known as Galls. There are various theories explanatory of how these galls or swellings arise. In some cases an irritant is believed to be injected by the female insect at the time of the laying of her eggs. In other cases, the movement and the feeding of the larval insect is the stimulus which, affecting the growing and dividing cells, results in the gall. In some cases, for example the Chermes galls on which I wrote so fully in last year's 'Transactions,' the abnormal growth follows the injection of a ferment by the female Chermes.

In the insect world, gall-inhabiting species are not confined to one insect Order, but nearly all the Orders contain representatives. The appearance and structure of such galls vary in an extraordinary way. Sometimes the gall affects only one member of the plant—a root, or a stem, or a leaf; but in other cases more than one of the main organs of the plant are altered. In this Report I give some notes on galls which continue to be sent to me, and which hitherto I have not described in the 'Transactions.'

GALLS DUE TO CECIDOMYIDÆ OR GALL-GNATS.

The Cecidomyids are minute delicate flies—the Hessian Fly is one of them and also the Pear Midge—many of which are the cause of galls. Willows are infested by a number of gall-gnat species, and these may be grouped as follows:—

1. Those that produce galls on two-year twigs (sometimes on younger) and older—*e.g.*, *Rhabdophaga* (*Cecidomyia*) *saliciperda*, the Willow Wood Gall-Gnat.
2. Those which cause swellings on the one-year-old twigs—*e.g.*, *Rhabdophaga* (*Cecidomyia*) *salicis*.
3. *Producers of malformations on the end of the twigs* (*buds*) through which the normal increase in length is hindered—*e.g.*, *Rhabdophaga heterobia*, *R. rosaria*, *Perrisia* or *Dasyneura* (*Cecidomyia*) *terminalis*, *D. salicina*.
4. Producers of galls on leaves—*e.g.*, *Perrisia* or *Dasyneura marginem-torquens* and *Oligotrophus* or *Hormomyia capreæ*.

RHABDOPHAGA SALICIPERDA.

This is a tiny fly $\frac{1}{12}$ inch and just over this long, with head and thorax black or black-brown, and with black hairing. The wings are milky white. The eggs are rounded and orange yellow. The larva is a small delicate-looking spindle-shaped maggot. On the under side just behind the head there is a chitinous structure known as the anchor-plate or process. The exact use of the anchor-plate is not known; perhaps it is used as a grater, or perhaps as an aid in changing position. The anchor-plate requires a microscope for its recognition; it is a very characteristic feature in Cecidomyid larvæ, and its varying shape is of great help in the distinction of species.

The females lay their eggs on *Salix alba*, *S. fragilis*, *S. caprea*, *S. purpurea*, *S. viminalis*, and exceptionally on White Poplar. The parts chosen for egg-laying are most commonly about two years of age and more, with branches up to three inches in diameter.

The female does not bore (her egg-laying tube is weak), but lays her eggs in chains or rows on the bark. The larvæ enter the bark, but by the time they enter below it, the cambium has already laid down the first layers of wood. Owing to the irritating presence of the larvæ the cambium gives rise to irregular streak-like growths, through which the larvæ make longish excavations; these galleries are irregular. Between the larval galleries the wood is normal. It is possible, I think, that the larvæ may not really need to bore in, as the activity of the cambium, with its wood formation, may be sufficient to enclose them.

For a time the bark stretches, accommodating itself to the increased thickening, so that only spindle-shaped swellings show; but ultimately the bark ruptures, and hangs down in shreds. For pupation the full-fed larva moves towards the outside, pupation taking place under only a thin external layer, which is easily broken through by two brown horns which are present in the pupa at the base of the antennæ. The empty pupal skin, with its "forehead horns," may be seen sticking out from the round exit-hole until the weather removes it. The bark from which the flies have issued is seen to be riddled with very minute holes. There is one generation in the year, the larvæ feeding from June or July of one year to the next April, May, or June.

Remedial Measures.—1. Cut off and burn infested shoots before issue of the brood. A very observant forester will recognise the swelling before rupture of the bark, and should remove the shoot. Another sign of the larvæ at work is the poor leafage. The cut-away parts should not be left lying about, else development to the adult stage and issue of the new brood of flies may be completed.

2. Streak over with tar the attacked places, for though the pupæ may push their way through, the fly will be caught in the sticky material.

RHABDOPHAGA HETEROBIA.

This Gall-Gnat is dusky-brown to black in colour, with the abdomen yellowish on the under surface. It is the cause of rosette galls at the apices of the shoots of *Salix triandra* and *S. cinerea*, and on the male catkins of *S. triandra*.

The shoots, on account of the orange-coloured larvæ at their apices, fail to elongate. The infested catkins are deformed and swollen, and show a woolly pubescence.

Galls contain a large number of larvæ, and the metamorphosis is completed in the gall.

This Gall-Gnat can be distinctly destructive where it occurs, because the varieties of willow attacked are the best varieties for buff wicker-work. Galls should be cut away and destroyed before the development of the insect is completed.

The foregoing two species of Gall-Gnat are the most destructive forms. The other Cecidomyids mentioned as on willow, may be summarised thus :—

Name of Cecidomyid	Plants attacked	Position and Nature of Gall.	Life History.
R. or C. Salicis	Salix cinerea ,, caprea ,, purpurea ,, aurita ,, viminalis	Spindle shaped or round swellings on the one-year-old twigs of both leading and side shoots. Leaf-stalks and mid ribs of leaves are swollen.	The life history is completed in the gall.
P. or D. terminalis	Salix fragilis ,, alba	At the tips of the shoots, the leaves being crowded together.	Life history completed in the gall, or the full-grown larvæ may fall away and pupate in the soil.
R. rosaria	Salix caprea ,, aurita ,, alba ,, purpurea ,, cinerea	Rosette like galls at the end of the shoots, due to the terminal inter nodes not growing, with the consequent crowding of shortened leaves.	Life history completed in the rosette.
D. or C. salicina	Salix alba	Bud-like gall in the terminal leaves at the tips of leading shoots.	Life history completed in the gall.
P. or D. marginem torquens	Salix viminalis ,, fragilis ,, caprea (rare)	In the rolled edges of the leaves which are tightly rolled towards the under surface; both edges of the leaf may be rolled.	Life history completed in the rolled leaves.
O. or H. capreæ	Salix caprea ,, aurita	Pear shaped or oval or rounded swellings on both upper and lower surface of leaves	The full-fed larvæ fall to the ground for pupation.

PONTANIA PROXIMA (*Nematus gallicola*). A SAWFLY GALL.

A very common gall on willow leaves, sent to me every year for determination, is that of a Sawfly (*P. proxima*). Sawflies belong to a different Order of insects from the Gall-Gnats; they are Hymenopterous insects belonging to the same Order as Bees, Wasps, and Ants. The majority of Sawfly larvæ are caterpillars with more than sixteen legs, and they feed exposed on the leaves of plants. Some species, however, are found in galls, and *P. proxima* is one of them.

The females of *P. proxima* lay their eggs in the leaf-buds of *Salix fragilis*, *S. alba*, and *S. cinerea* in May, and the galls, somewhat like a bean in shape, can be found in numbers—several to a leaf—in summer. The gall is more or less solid at first, but the caterpillar on hatching eats so that a distinct chamber results. After a time the caterpillar, green in colour and with a dark head, makes a little hole to the outside, and uses this for throwing out the excrement. When the caterpillar is full grown it leaves the gall and passes into the soil below to pupate. The pupa is under cover of a spun cocoon. Occasionally the full-fed larva, instead of coming to the ground, enters a crack in the bark, and pupates in this shelter place. The galls are green in colour, and later in the season the exposed part of the gall on the upper surface of the leaf becomes red.

CONTARINIA (CECIDOMYIA) TILIARUM.

This gall on the twigs and the inflorescences of the lime-tree was sent to me several times for identification. The galls are round, one-third of an inch and over in diameter, and each gall contains a number of typical Cecidomyid larvæ.

OAK GALLS.

The Oak is a species which harbours many different kinds of gall, the work being chiefly that of the Hymenopterous family Cynipidæ. The adult insects are small, and are often far more like one another than the galls which result from their punctures. The larvæ are legless grubs. The gall sometimes contains, in addition to the actual owner, guest Cynipids. An interesting feature in the life-history of some Cynipids is the occurrence of an alternation of generations in the life-history, one generation consisting of males and females reared in a gall of one form, while the other generation consists entirely of virgin females reared in a gall of a different shape, and also, as sometimes happens, on a different part of the plant.

THE MARBLE GALL (*Cynips Kollari*).

Only females are known of this species. These prick for their egg-laying a terminal or side-bud of the oak. The galls show in June, and are one-chambered. The galls, yellow-brown in colour, are mature in September and October, when the adults issue and prick the buds. Some over-winter in the gall, coming away in the next year from April to June.

THE SPANGLE GALL (*Neuroterus lenticularis*) and the CURRANT GALL (*Neuroterus* (*Spathegaster*) *baccarum*).

The Spangle Gall is the commonest of the lens-shaped galls (Fig. 16). Fertilised females from a Currant Gall prick the under-surface of oak leaves in June for the laying of their eggs. The gall appears first as a tiny projection on the under-side of the oak leaf, and as it grows, takes on a lens or button-like

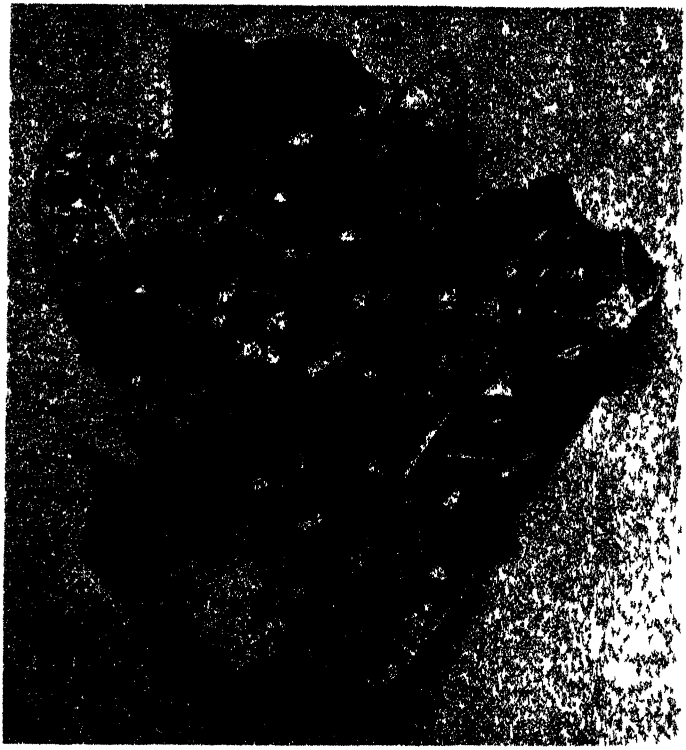


Fig. 16.—*Galls of* Neuroterus lenticularis
Natural size. From nature.

appearance; it is attached to the leaf by a minute stalk. The yellow-green colour of the gall is hidden under a number of red-brown or yellow-red hairs. The galls have the rim slightly turned up, and there is a boss in the middle. The galls are full-grown in September, and measure about $\frac{1}{8}$ inch across. They fall away in autumn, and remain in the litter below the trees. Each gall contains one larva, and this larva pupates in the gall. The adults come away in April. Only females are found, and these virgin females lay their eggs beneath the bud-scales of oak; as a result, small globe-shaped galls

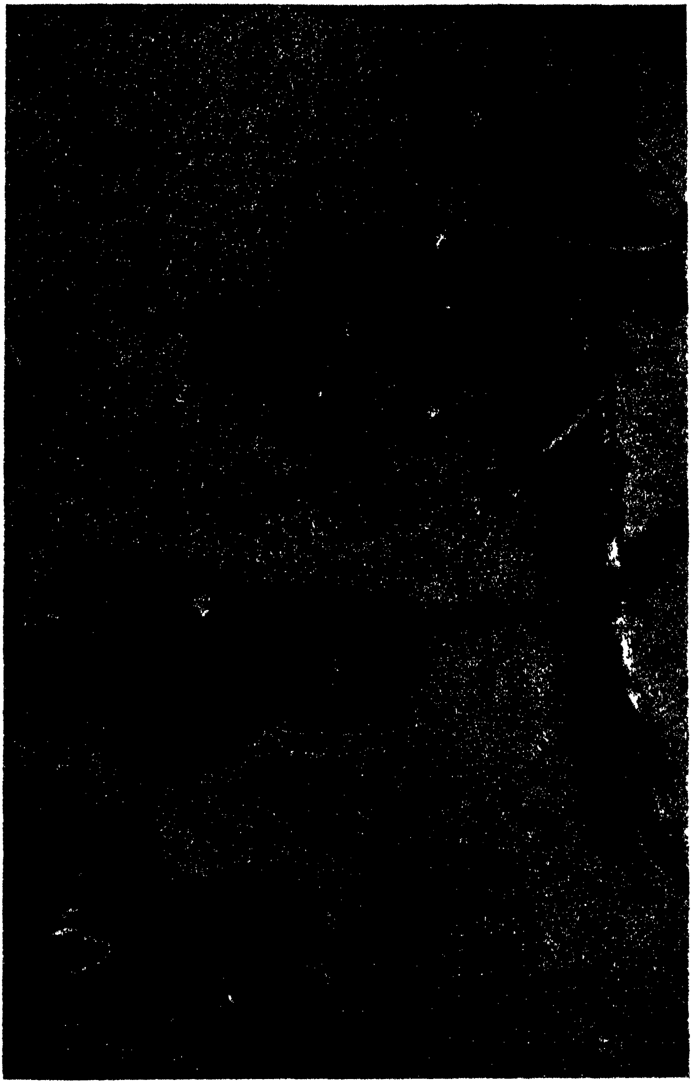


Fig 17.—*Galls of* Neuroterus baccarum *on leaves and male inflorescences of oak.*

Natural size. From nature.

that look like red currants are produced on the leaves and the male inflorescences (Fig. 17). These currant galls grow quickly, and the larva inside also develops rapidly, so that pupation is complete in the gall and the adults ready to come away in June. From the ripe Currant Galls males and females come; pairing takes place, resulting in the fertilised females with which we began this life-history.

GALLS ON ROSE

Certain Cynipids of the genus Rhodites cause galls on Rose. One of these is *Rhodites rosæ* (Fig. 18), which is the cause of the mossy-looking growths on rose shoots, both wild and cultivated. These galls are known as Robin Redbreast's Pin-cushion or the Bedeguar Gall. The female pricks a bud, and some of the leaves become altered to give rise to the gall. The gall is a many-chambered one. Pupation takes place in the gall, and after the adult insects (males are rare) have escaped, and the mossy-looking hairs have been removed by the action of the

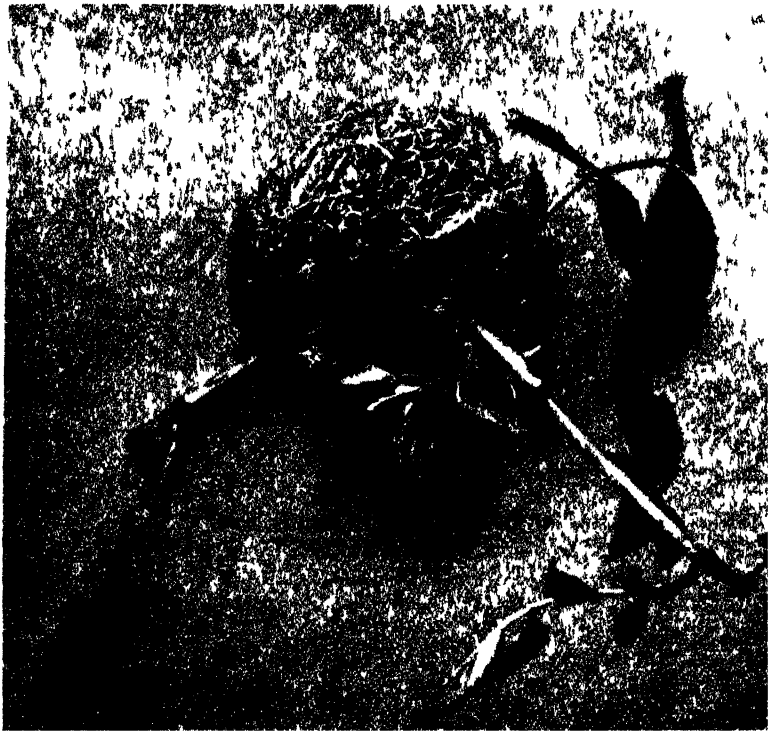


Fig 18. —*Gall of* Rhodites rosæ

Natural size From nature

weather, numerous exit-holes show on the woody-looking part that remains.

On the leaflets of Sweet Briar and of the Dog Rose small galls, green-pink in colour, and with projecting spines, may be seen in July. The galls are those of *Rhodites rosarum ;* their size is that of a pea. On the same Roses, and also on the Burnet-leaved Rose, a smooth globular gall, that of *Rhodites eglanteriæ*, is found ; the common situation for this gall is on the upper surface of a leaflet. The galls are greenish-red, and are found from July to October. On the Burnet-leaved Rose little kidney-shaped or oval galls can be found on leaf, leaf-stalk, stem, and flower-bud. The galls are covered with little spines, and are those of *Rhodites spinosissimæ.*

FURNITURE BEETLES.

Now and again in different years in the 'Transactions' I have given notes on these beetles. In response to many inquiries, I make these notes much fuller, adding considerably, and I hope usefully, to the preventive and remedial measures. Already there has existed a fairly extensive body of literature on the Furniture Beetles, but since 1915 new work and new publications have appeared, and general interest has been stimulated by the notices in the press of extensive repairs to the famous old roof of Westminster Hall, necessitated by the destructive work of the largest of our Furniture Beetles. The new work includes an exhaustive paper on the distinguishing characters of the larvæ of the Furniture Beetles, worked out in my laboratory at the University by Dr J. W. Munro;[1] an excellent Swedish paper by N. A. Kemner,[2] and a most helpful description and account of the Furniture Beetles by Dr Gahan, Keeper of the Department of Entomology at the British Museum (Natural History).[3]

The breaking down and destruction of timber, whether in the open or indoors in dry conditions without exposure to the weather, are due chiefly to the activities of fungi and insects. In the water we have animals, other than insects, destructive to timber and pier props—for example, the Crustaceans *Limnoria lignorum* and *Chelura terebrans*, and the Mollusc known as the Ship-Worm (*Teredo*), all three actively at work round our own shores. On worked dry timber indoors.

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[1] "The Larvæ of the Furniture Beetles—Families Anobiidæ and Lyctidæ," by James W Munro, D.Sc ('Proceedings of the Royal Physical Society of Edinburgh,' vol xix. No 8, 1915)

[2] "De ekonomiskt viktiga vedgnagande Anobierna," by N. A. Kemner ('Meddelande, No. 108, fran Centralanstalten for forsoksvasendet pa jordbruksomradet Entomologiska avdelningen,' No. 19).

[3] "Furniture Beetles," by Charles J. Gahan, D.Sc. (Economic Series, No 11, British Museum (Natural History)').

however, in the temperate parts of Europe, the chief insect enemies are the furniture beetles of two families, Anobiidæ and Lyctidæ.

The actual damage done to the wood or furniture is due to the tunnelling of the larvæ. These are soft-bodied, yellowish-white grubs with horny brown heads sunk in the first joint of the thorax. The mandibles are fitted for gnawing. There are six weak legs on the thorax. The larvæ are straight in their youngest condition, but when older have the body curved, and distinctly thicker at the thoracic end. In the Anobiid larvæ the legs are five-jointed; in the older larvæ very minute spines on the skin, by fixing into the sides of the tunnel, aid in the movements of the larvæ. Lyctid larvæ lack the spines.

The Common Furniture Beetle (*Anobium striatum*, Oliv., *punctatum*, De Geer, *domesticum*, Fourc.).

This beetle measures from ⅛ of an inch to about ⅙ inch in length, and is brown in colour, with a covering of minute grey hairs (use a lens). The head is withdrawn into or sunk in the raised front part of the thorax, which looks hood-like when viewed from the side. The wing-covers show longitudinal ridges and furrows (hence the name *striatum*), and rows of small pits may be seen by aid of a lens. The antennæ are eleven-jointed, and the end three joints are manifestly larger and broader than the others. There are six legs easily visible, unless when the beetle, on being disturbed, feigns death by withdrawing its head and tucking its legs under the body; in this condition of trance or pretended death the beetle may be pretty roughly used without being tempted to show signs of life. It is this death-feigning habit which has earned for the beetles the name Anobium, which means *lifeless*. Yet their death-feigning is exaggerated when Linnæus writes of *Anobium pertinax*, "Neither by force nor by any torture can it be driven to flight, neither by water nor by fire nor by corrosive spirit can it be excited."

Life History.—The beetles come to the outside to pair. The fertilised female lays her eggs, as a rule several together, in cracks in the wood, or just inside exit-holes that are present. "When seeking a place to lay her eggs, the female extends her ovipositor, bends it first to one side and then to another, exploring the surface, until it touches upon some slit or crack suitable to receive the eggs. There she deposits them, one or two at a time, and then continues the search, and deposits others until her whole supply is exhausted" (Gahan). The number of eggs laid by a female is not large.

The larvæ on hatching gnaw into the wood, making a tunnel which is choked up behind the feeding grubs by bore-dust and by pellets of excrement; part of the gnawed wood is swallowed and passed along the alimentary canal of the larva, indigestible and undigested material being passed to the outside of the larva as excrement. The frass is not pushed to the outside of the wood through the original entrance-hole, as is a common habit with the bark-borers of the family Scolytidæ. When the grub is nearing the end of its growth, it eats towards the outside (sometimes even perforating the outside wood by a very small pore, but, as a rule, leaving a thin partition), and then, withdrawing a little, makes a chamber shut off by a little plug of sawdust from the tunnel, and there pupates. When the pupal stage is over, the beetle eats its way through the thin portion of wood that lies between the pupal chamber and the outside. The exit-holes of this species measure from $\frac{1}{20}$ to $\frac{1}{12}$ inch in diameter. The length of the life-cycle varies, according to the conditions, from one to two years.

A. striatum can also be found out of doors in dead branches. *Anobium striatum* occurs in pine and spruce wood, and in the wood of a number of broad-leaved trees—*e.g.*, beech, oak, alder, sycamore, willow, and others.

Anobium paniceum (*Sitodrepa panicea*), an allied species, but smaller and with hairy eyes, is a pest on stored comestibles—flour, biscuits, coffee, beans, drugs, and also on leather, books, manuscripts, pictures. Notes were given on this species in the 'Transactions' for 1917.

Ernobius mollis, another species of the family, larger and with the wing-covers not showing the lines of punctures, has been recorded by Mr J. C. F. Fryer in spruce flooring-boards, and by Dr J. W. Munro from old rafters in Aberdeenshire. It is not really a furniture beetle, but an open-air species, with its galleries under dead bark of standing trees or palings. While the commoner position for the tunnels of this species is between the wood and the bark, yet if the bark be very thin these are made in the outermost wood. The work is in Coniferous species. The adults may be found flying in the open and indoors. The full-fed larva pupates in a chamber whose walls are composed of sawdust and excrement; this pupal chamber is at the end of the larval tunnel, and always near the outer surface.

PTILINUS PECTINICORNIS.

This is also an out-of-door species, but is quite correctly included under the name Furniture Beetle, for there are numerous records of its presence in furniture. Not very long ago I got large numbers of this species in the legs and back of some chairs in a church in the west of Scotland. The legs of the infested chairs were reduced internally to a mass of fine powder, while scores of flight-holes were distributed over the chair This beetle may be found in the same kinds of wood as the Common Furniture Beetle, but chiefly in that of broad-leaved trees; its flight-holes are a shade larger. The beetle itself is distinguished from *A. striatum* by its greater size—viz., over ⅛ inch,—by the absence from the wing-covers of the longitudinal lines and furrows, and by its very characteristic antennæ. The antennæ are comb-like, the teeth of the comb being specially long and easy to see in the male. The larvæ are rather like those of *A. striatum*, but the little spines on the back are smaller and weaker, and are not backwards directed. The females are said not to leave the burrows, but to accomplish their pairing just inside the exit-holes.

XESTOBIUM RUFOVILLOSUM, De Geer (*tesselatum*, Oliv.)

This is the largest member of the family, and measures up to about ⅓ inch. The general colour is dark-brown with irregular patches of short yellow-grey hairs. The front part of the body behind the head is convex, and slopes away "towards the broadly flanged sides," which "one of the first writers describing the beetle was mistakenly led to call its ears" (Gahan). By means of a good lens the interested student will be able to make out the following diagnostic features of this species—(*a*) the absence of the lines of punctures down the wing-covers; (*b*) the first joints of each of the hind-legs meet and touch one another; (*c*) the tibiæ are slender; (*d*) the joint of the feet nearest the claws is elongated; (*e*) densely arranged punctures on the parts of the body free from hair.

The larvæ are also larger than those of the other species, and measure when full grown between ¼ and ⅓ of an inch. On the upper surface of joints 3, 4, 5, 6, 7, 8, 9 is a well-marked band of little hooks; the hind part of the body is curved.

The work of *X. rufovillosum* is readily distinguished from the other Anobiid beetles by the size of the flight-holes (see Fig. 19), which may be over ⅛ inch in diameter, considerably larger than those of any of the other species. *X. rufovillosum* is commoner out of doors than indoors. In the open its work is on stumps and branches of oak, chestnut, beech, willow. Ratzeburg has recorded a case on *Abies nobilis*, Kemner names spruce, and Gahan records an exceptional case on pine-wood from an old church. Indoors oak and chestnut are favoured, and rough timber is used rather than small furniture. An interesting example of the destruction possible by this beetle is the damage to the famous old oak roof of Westminster Hall. Considerable areas of this roof and supports, dating back to the time of Richard II., were, on examination in 1912, found to be honeycombed with the workings of *Xestobium*, and up till now operations have been going on to arrest and prevent further decay.

The life history resembles that of the Common Furniture Beetle, but the length of the life cycle is probably considerably longer. The larvæ work in the longitudinal direction of the wood (Fig. 20), and the dividing wall between gallery and gallery, consists of the harder part of the wood of the year's growth. The galleries behind the feeding larvæ are stuffed with excrement and bore-meal; the excremental pellets of the larvæ of this species are characteristically large and flat—lens-shaped. A common name for *X. rufovillosum* is the Death-Watch Beetle. Ticking noises come from furniture or wood containing these beetles. The ticking noise is due to the tapping of the lower front part of the head of the adult beetle against the wood. The tapping is really a call-note or "love-song," and by means of it the two sexes signal and communicate with and find one another. The tapping is heard by people most readily at night, and by invalids unable to sleep and with their nerves on the stretch, and by superstition and story has come to be associated with an ominous warning of death, hence Death-Watch Beetle. At the present moment I have ten *X. rufovillosum* beetles on a piece of old

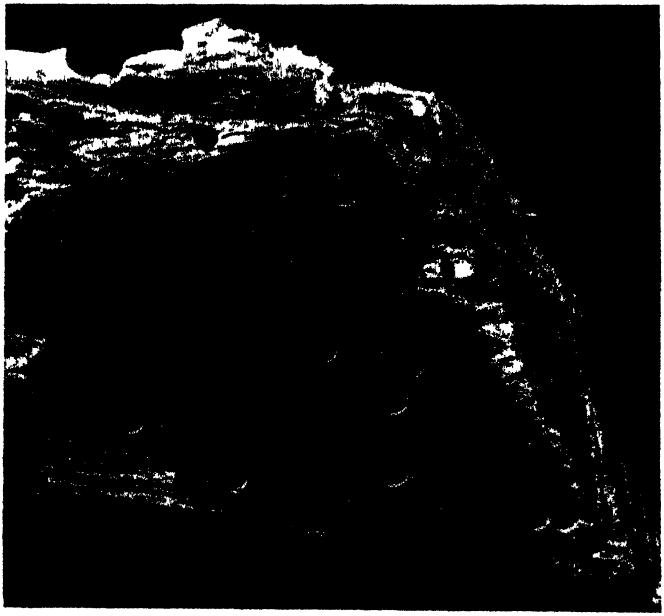

Fig. 19.—*Piece of oak showing exit-holes of* X. tesselatum.

Natural size. From nature

and dry apple stem, enclosed in a wooden box, and when I tap gently on the box with a lead-pencil the beetles respond by tapping in turn. Turning back the lid of the box and exposing the beetles to the light does not inhibit the tapping, which is sometimes against the wood of the box and sometimes against the piece of stem in which the beetles were reared. At least twenty eggs have been laid. While then there is no doubt about the tapping of *X. rufovillosum*, doubt has been hinted as to whether the Common Furniture Beetle taps. No tapping noise is made by Ptilinus or Ernobius or Sitodrepa.

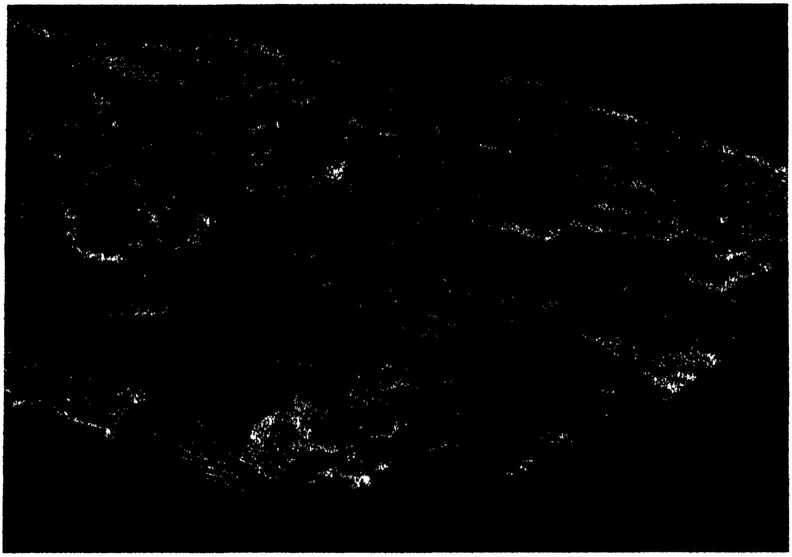

Fig 20.—*Piece of oak tunnelled by larvæ of* X. tessellatum.
Natural size. From nature.

The Family Lyctidæ.

The beetles of this family have not the rounded form of the Anobium beetles, but are narrow in appearance. The antennæ are eleven-jointed, the two end joints forming a distinct club. The head is prominent and is constricted behind the eyes. The legs are slender and are not drawn in; the last joint of the tarsus is longer than the rest taken together.

Lyctus brunneus (Stephens) measures from about $\frac{1}{8}$ inch to $\frac{1}{6}$ inch in length; the colour is dark brown; upper surface of prothorax densely punctured; wing-covers with the sides almost parallel, and the upper surface with very fine lines of punctures.

Lyctus linearis, Goeze (*canaliculatus*, Fab.), scarcely differs in size from the last: colour rusty brown; upper surface of prothorax with a deep oval impression.

The larvæ of Lyctus resemble in general appearance those of Anobiids, but can be distinguished as follows: the body rather more bent; head more deeply sunk in body; antennæ four-jointed; the body behind the head more swollen than in Anobium; the legs are only three-jointed; front legs stronger than the other pairs; the last pair of spiracles much larger than the others.

The beetles prefer wood air-dry and sheltered from the weather, and are found in cabinets, chests, presses, cupboards. The females lay their eggs in cracks or crevices in the wood, and the larvæ bore in the outermost wood or sapwood or splint, as it is called, and not in the hard or heart-wood. The timbers attacked are those of such broad-leaved trees as oak, sweet chestnut, ash, hazel, elm. The bore-meal is in the form of very fine powder; this fine powder is not pushed to the outside, and considerable damage may be done before the external signs of the enemy are very evident.

TREATMENT FOR FURNITURE BEETLES.

There are two ways by which infection of furniture may come. Firstly, the adult beetles can fly, and so may enter houses from the outside, and proceed to their egg-laying. Secondly, the pest may be introduced in the larval stage in wood or piece of furniture. From such an infected piece of furniture adults will probably issue later on, and so spread the infection. As soon, then, as a piece of furniture is known to harbour the enemy, it should be isolated and treated.

How infested pieces of furniture should be treated depends to a great extent on the bulk of the object, and whether or no the wood is plain or delicate and polished. Part of the failure that may attend the painting of the outside of an infested piece of furniture with some insecticide for remedial purposes is that the insecticide does not penetrate sufficiently far to reach the grubs. Considerable protection is given to furniture just from the very fact that it is polished. The beetles find it difficult or it may be impossible to attack successfully surfaces that are painted over and polished and are without cracks. Rough backs or concealed portions serve as starting-off places for the beetles, and in time the whole piece of furniture succumbs to this flank attack. Exterminative measures against these insects are attended with considerable difficulty, because, as indicated in the life-history, the larvæ are in galleries sunk in the wood, with a protection behind them of loose bore-meal and sawdust. The insects are nearest the outside in the egg stage and in the pupal condition, and if it were possible by observation to gain information as to swarming periods, then the best times for treatment would be just before and just after such periods.

Boiling Water.—If the infected piece of wood or furniture allows, an excellent measure is the steeping of it in boiling water; this would be efficient for such forms as were near the surface and in such burrows as were reached. Sometimes infested wood is exposed to thorough steaming in a room or receptacle made air-tight. Steaming under pressure, however, weakens and discolours wood.

Dry heat can be very effective with furniture or seasoned wood. By baking in an oven or other receptacle suitable to the size of the piece of furniture, the insects would be destroyed in any of their stages of development. Temporary heating at about 180° F., or a more prolonged exposure at 130° F., would kill.

The commoner methods, however, are to make use of irritants and poisons in liquid form or as fumigant gases.

Liquids.—Quite a large number of acids and other liquids are named in the literature as having been used for the painting over of infested wood, but failure or comparative failure has resulted, because of the difficulty of penetration and the rapidity with which they evaporated.

Compounds of arsenic have been used and dilute solutions of corrosive sublimate (mercuric chloride), these being painted over the wood, or injected into holes by means of a syringe with a fine nozzle. Long ago, a little corrosive sublimate dissolved in methylated spirits was the recommended treatment for running into the burrows of the borers. It should be noted, however, that both arsenic and corrosive sublimate are dangerous poisons, and used indoors in the quantities that might be necessary are distinctly dangerous to the health of the inmates.

Benzine is also an old remedy as an insecticide. With it there is the risk of fire owing to its inflammability. It could be used for any fine articles, where its quick evaporation might be an advantage.

Carbon tetrachloride, because it is non-inflammable, is better than benzine; it has no effect on the inflammability of the wood, and does not discolour the wood.

Some successful experiments at the Heriot Watt College, Edinburgh, were done with naphthaline dissolved in carbon tetrachloride. The larvæ of *X. tesselatum* were killed by this treatment. Naphthaline is a well-known insecticide, with the advantages of cheapness, slow evaporation so that it does not disappear rapidly, and absence of discoloration of the wood. Naphthaline is very readily soluble in carbon tetrachloride (which, as already stated, has insecticidal value of its own), and the solution does not harmfully affect the timber or leave any permanent mark on it. Its application does not involve any risk of fire nor of injury to workmen who may be applying the liquid. When the carbon tetrachloride evaporates (and its evaporation is rapid), the naphthaline is left behind to slowly volatilise. In the Heriot Watt College experiments reported to me at the time (the spring of 1914), the solution was found to spread rapidly in the experimental pieces of oak wood, both transversely and longitudinally, and grubs present were invariably killed.

Kemner mentions melted paraffin in its use for protecting museum specimens against these borers. Paraffin is liquefied at a high temperature, and the attacked articles are submerged in it and left for a time. The heat kills the boring insects if the treatment be extended long enough, while at the end of the operation paraffin has penetrated, to a slight extent at least, through exit-holes and galleries, and forms on cooling a sort of protective layer against new attacks. In addition, there is some improvement in stability, the loose sawdust particles having been compacted. The paraffin sticking to the outer surface can be knocked off or removed by superficial heating.

Gases.—One of the strongest insect poisons is hydrocyanic-acid gas. Especially in the United States fumigation with hydrocyanic-acid gas is an extensively practised measure for the destruction of many different kinds of insects. The gas, however, is so poisonous and so dangerous that it should only be used by experts familiar with the best methods of making and applying the gas, and alive to the risks to human life attendant on its careless use.

Sulphur-dioxide has for long been named as a fumigant against wood-borers. It is best prepared by burning sulphur in an air-tight receptacle, in which the piece of furniture to undergo treatment has been placed. In ordinary fumigation a whole day's exposure is advisable. It should be remembered that sulphur fumes bleach fabrics, hurt plants, and impair and may destroy the germination of seed. Gahan mentions a useful modification of the sulphur-dioxide treatment. The sulphur-dioxide, bought compressed into liquid form, is made use of to dissolve camphor, and then the solution is painted over the infected wood. The camphor crystallises out, and "forms a temporary crust which prevents the escape of the gas outwards, and causes it to penetrate the wood" (Gahan).

Bisulphide of carbon is a good fumigant (a full account of bisulphide of carbon was given in the 'Transactions' for 1918). The liquid volatilises into a gas heavier than air. A saucer or other vessel is laid on the top of the piece of furniture that is being treated, and the liquid bisulphide of carbon is poured into the saucer and the whole then placed in an air-tight box or chamber. Bisulphide of carbon fumes are poisonous and, in the presence of a light, explosive.

Formalin, vaporised by means of heat and then led to the treatment-chamber, has been tried in Sweden, but the method is not recommended.

Mr H. Clifford Smith, in 'Country Life' for 16th October 1920, urges that parchment size should play a leading part in the preservation of "worm-eaten" wood. The size is made from strips of parchment bought from a bookbinder. Mr Smith's recommendation is as follows: "It should be cut into small pieces, and allowed to simmer for several hours in a small quantity of water. The liquid, which is colourless and does not stain the most delicate of woods, should be used warm. If the wood is more or less decayed, the size should be applied two or three times with a brush and allowed to soak in, or it may be injected into the holes in the wood with a hypodermic syringe, care being taken to warm the syringe first, or it may be worked into the holes with a fine camel-hair brush." The purpose of the size is to harden the wood and act as a deterrent. Warm water will remove the size remaining on the surface after application and drying. "A polished surface which has been dulled as the result of the application of hot size can be revived by means of ammonia."

The fact that furniture to undergo treatment for the borers may be delicately polished furniture, and that the polish is liable to be destroyed by the treatment, is a not uncommon difficulty. Coarse woodwork is best protected against the borers by being treated with carbolineum or creosote; this treatment would be suitable in cases and exposed situations where the odour and the discoloration of the wood which accompany the use of carbolineum and creosote need not be considered.

THE ERMINE MOTHS (*Hyponomeuta*).

These are small moths—named Ermine from their front wings being white or grey-white, spotted with black—species of which are very troublesome to the fruit-grower and on occasion to the forester. *Hyponomeuta padellus*, L., and *H. malinellus*, Zell., besides being most destructive on fruit trees, are very easily spread in exported stock.

H. padi, Zell (*evonymella*, L.), is so named from its common food-plant *Prunus padus*, the bird cherry. I have held back some notes on this species in the hope that I would be able to work up the parasites which I bred out in very large numbers from this species. The damage—devastation is not too strong a term—done was in a natural plantation of from 125 to 180 acres in Lanarkshire. The timber in the plantation consisted chiefly of oak, alder, birch, birch cherry (*P. padus*), gean (*P. avium*), rowan, blackthorn, hawthorn, rose (*Rosa* *canina*), ash, hazel, elm, spruce, and Scots pine. There was no *Euonymus* in the plantation. I visited the area with my friend Mr Alexander Stuart, who took me through the attacked plantation, and later made some useful observations. By far the worst attacked tree was the bird cherry (*P. padus*), complete defoliation taking place in many cases. Damage to alder came next. The blackthorn (*Prunus spinosa*) was slightly attacked, and hawthorn did not wholly escape. *Rosa canina* also suffered. The gean (*P. avium*), though in a number of cases growing among badly-infested bird cherry (*P. padus*), remained free from attack. Webs and masses of cocoons were found on other species—*e.g.*, on Scots pine, but the leaves of these other trees had not been eaten by the Ermine moth-caterpillars, and had just been used, for the

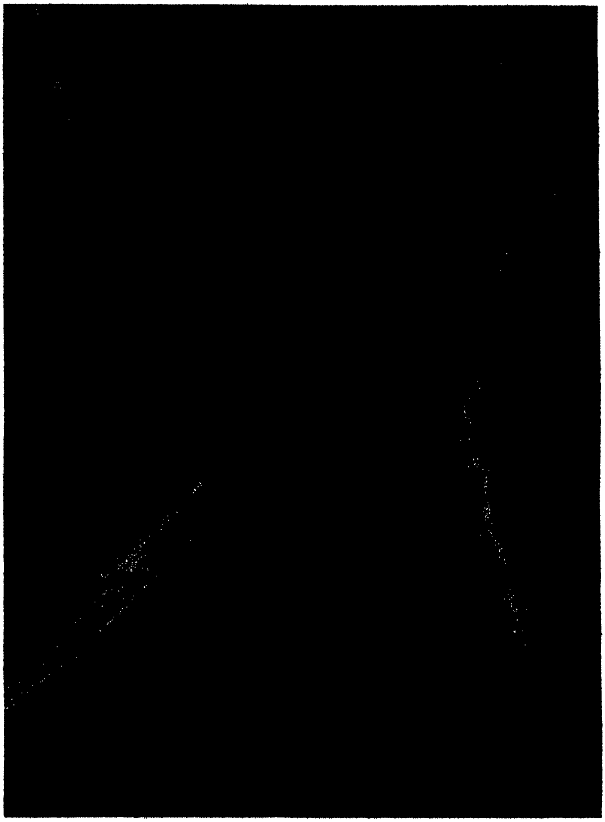

Fig. 21.—*Web spun by caterpillars of* H. padi *on* Prunus domestica.

Natural size. From nature.

attachment of the nests of Ermine cocoons, on account of their proximity to attacked species.

Attention was first drawn to the presence of the caterpillars about the middle of June, when from a considerable distance away trees were seen to be partly defoliated and branches bare, and by the first week of July many of the *Prunus padus* were quite defoliated, and the stems and branches enveloped in a thin white or dirty-white silk-like covering spun by the caterpillars (Fig. 21).

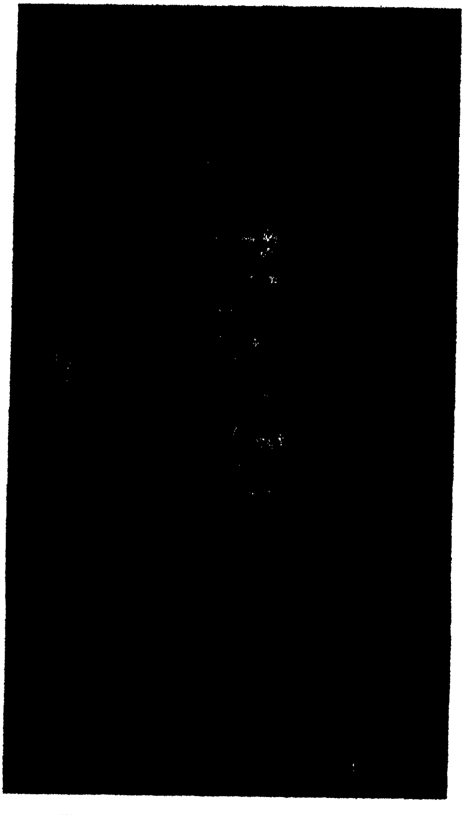

Fig. 22.—*Eggs of* H. padi *on twig of* Prunus padus.

Natural size (to the left), magnified (to the right). From nature.

THE MOTH AND ITS LIFE HISTORY.

H. padi is a small moth measuring just over a third of an inch in length and less than an inch in spread of wings. Its front wings are whitish, and have five rows of numerous black dots; the fringes of the wings are whitish; the hind-wings are dark-grey. The caterpillars vary from green-grey to dark yellow-brown, and have sixteen legs; the head is black, and has pale hairs on it; the segment behind the head has a dark-brown to black plate (really two plates separated by a longitudinal line) on its upper surface; on the other joints all down the body, on each side, are prominent black warts or dots; the two legs on the last joint project rather backwards.

The moths are found flying in July and August. They lay their eggs on the young twigs of *Prunus padus* (Fig. 22); the eggs are in clusters arranged like the tiles on a roof, and covered with a glutinous excretion which soon hardens. The number of eggs in a cluster varies. The numbers in each of twelve clusters counted by me were—51, 54, 48, 48, 44, 115, 50, 64, 79, 102, 79, 63. The egg-clusters varied in colour from white to pinkish-red to brown. The eggs hatch in the autumn, but the minute caterpillars remain over the winter under the protection of the hard shield. I examined some egg-clusters on 15th January and found young caterpillars, but there were also unhatched eggs. The tiny young caterpillars leave the protective crust in April, and may, like those of the Hyponomeuta destructive to apple-trees, enter the opening *Prunus padus* buds and mine into the young leaves, causing discoloration. Then follows the attack on the expanded leaves, the caterpillars feeding under cover of the web-like covering mentioned above. Then nests are made on the twigs by weaving together leaves and parts of leaves and young twigs, and as material fails for the nest—which has been gradually made bigger—new nests are made on other twigs. A nest contains many caterpillars. The full-grown caterpillar pupates in a thick white cocoon, and great numbers of such cocoons lie in, and are attached to, a nest (Fig. 23). In July and early August the cocoons were found in numbers, and still masses of caterpillars were crawling in and over the nests. The pupal stage lasts from less than a fortnight to over a fortnight, according to the external conditions. The moths (Fig. 24), which were soon in myriads in the Lanarkshire plantation, were sluggish

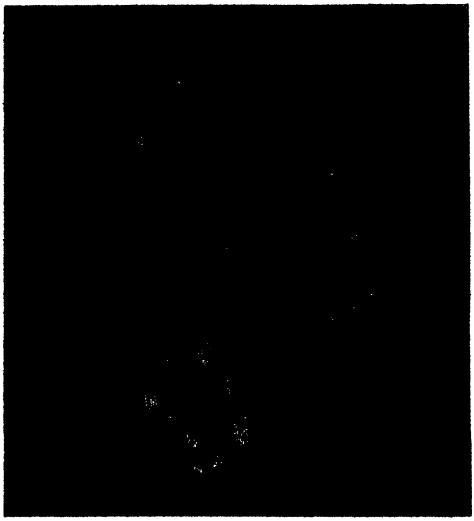

Fig. 23.—*Nest with enclosed cocoons of* H. padi.

Slightly reduced. From nature.

in the daytime, their narrow wings rolled round their body; but they flew nimbly, though not for great distances, in sunny evenings.

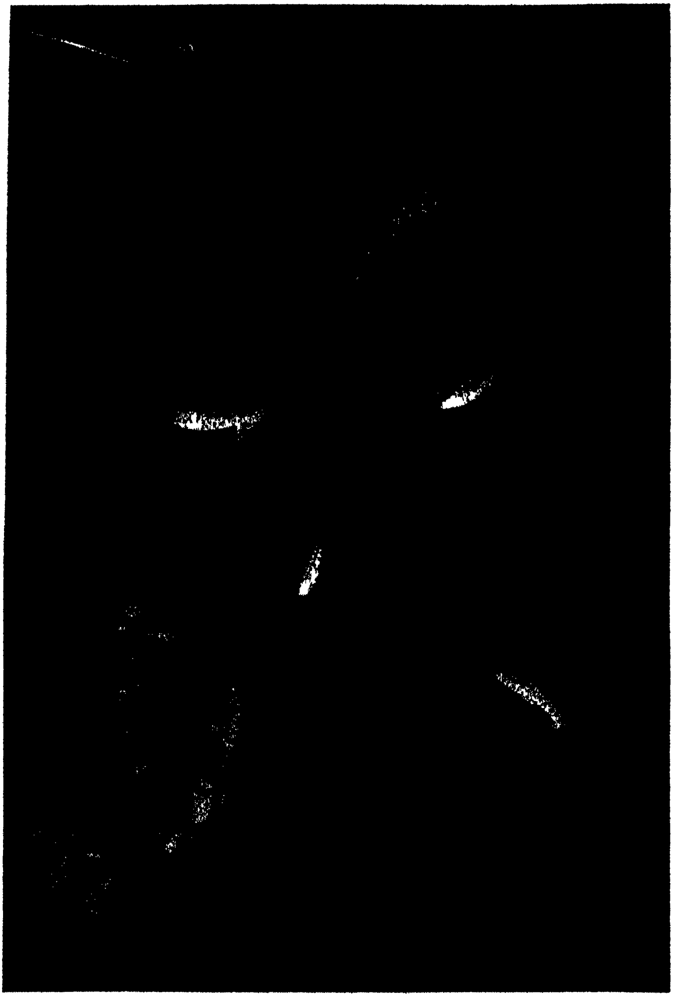

Fig. 24.—*Web of* H. padi *on* Rosa *sp., showing cocoons and newly-issued moths.*

Natural size. From nature.

It is true that, as a rule, the resulting damage is not overwhelming, because time enough remains in an open season for the development of a new crop of leaves; but in the case now recorded the new leaves were small, many of the young shoots were dead, and no fruit or seed was produced by the badly-attacked trees. Leaves of trees that had not been attacked or eaten were dead when they were on branches that had been covered by the web.

I bred out and collected a very large number of parasites of different species from the infested material.

Apanteles glomeratus, A PARASITE ON CABBAGE BUTTERFLY CATERPILLARS.

In the 'Transactions' for 1915 I gave some notes on the large white cabbage butterfly, stating that the caterpillars were partly kept in check by a Braconid parasite. The cocoons of these parasites (*Apanteles glomeratus*) have several times recently been sent to me for determination, and they are really often noticed, but not so often recognised as the cocoons of a helpful ally of the grower of cabbages. Specially the caterpillars of the second brood of Large Cabbage White Butterflies are infested by the parasites. The parasitic insect is a minute four-winged form measuring in length less than one-eighth of an inch. The females land on the young Cabbage Butterfly caterpillars, and by means of their ovipositor lay thirty to sixty eggs inside a caterpillar. These eggs hatch into legless maggots, which breathe by a curious swollen projection from the abdomen. They devour the fatty body of the caterpillar. This fatty body is a store of reserve (it can have additional functions) laid up by the caterpillar, which can be drawn on, for example, during the resting, non-feeding chrysalid stage. When the Apanteles maggots have become full-grown, they bore their way out through the skin of the unhappy caterpillar, and add insult to injury by at once spinning their yellow cocoons and attaching them (not very tightly, however) to the outside of the skin of the practically motionless and ready-to-die caterpillar. The numerous fine exit-holes of the Apanteles larvæ, in the skin of the caterpillar, may in time heal up; but the caterpillar never recovers, and its shrivelled skin may be seen under cover of the Apanteles cocoons. Mr J. Bronté Gatenby[1] has recently published some most interesting notes on this Apanteles parasite, and how it makes its exit from the butterfly caterpillar. Mr Gatenby finds that the parasitic larvæ make their exit from the body of the caterpillar when the latter is about half-grown. About the time of the exit of the parasite the caterpillar is immobile, the immobility being due "either to a partial nervous paralysis, or more likely to a rupture of many of its body-wall muscles." Examination of the caterpillar in this immobile stage reveals a number of "round pale whitish spots, caused by the contained parasites beginning to eat or to gnaw their way outwards," in doing which they first gnaw away the muscles and the inner skin. The parasites bore out through the sides of the caterpillar.

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[1] "Note on *Apanteles glomeratus*, a Braconid Parasite of the Larva of *Pieris brassicæ*," by J Bronté Gatenby, B.A., B.Sc., in 'The Entomologist's Monthly Magazine,' January 1919 and February 1919.

THE WHEAT BULB FLY (*Hylemyia coarctata*).

The late spring and early summer of 1920 were marked in several counties in Scotland—*e.g.*, Mid-Lothian, West Lothian, Fife, Forfarshire—by a severe attack of the Wheat Bulb Fly. In previous numbers of the 'Transactions' I have named this enemy, and in pointing out that its life-history was not fully known,—the difficulty being where and in what stage the insect passes the winter,—I stated, with examples, that attack by the wheat bulb fly was worst after bare fallow and bad after certain crops. Here are additional notes on this, relating to the attack in spring and early summer 1920, from Mr J. Moffat Scott, Inchook, Arbroath :—

On one acre of wheat, previous crop tares, sown in June and cut in September, the wheat was "practically unaffected."

On five acres of wheat, previous crop "Arran Chief" potatoes (typical maincrop), attack was "appreciable, but not severe."

On four acres of wheat, previous crop "Arran Comrade" potatoes (second early) and "Evergood" potatoes (early maincrop with light shaws), attack was "severe."

On Section I. of a field of wheat the previous crop was "King Edward" potatoes (early maincrop with light shaws), and on Section II. of the same field previous crop "Fosterton Hybrid" turnips, the attack of the wheat bulb fly maggots was much worse after the "King Edward" potatoes.

On a third field of wheat, where previous crop had been "King George" potatoes (early second early), infestation by the wheat bulb fly maggots was so bad that the whole field had to be ploughed up.

Writing to Mr F. R. Petherbridge,[1] Cambridge, Mr F. Hiam, one of the largest fen farmers, says: "The wheat bulb fly does not appear to do much harm in a wet, cold, or damp summer, but during a dry summer, say from 20th July to 29th September, on all bare lands—namely, fallows, early potato land, or late potatoes, mangolds, and swedes—where there is not sufficient top to keep the sun from the land, the bulb fly will deposit her eggs, and if wheat is sown, it is sure to be practically spoilt when the eggs hatch in the spring.

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[1] 'Journal of Agricultural Science,' vol. xi., Part I.

On wet land or in a wet season, the eggs do not seem to mature. No other crops are damaged by this pest,[1] and it is quite safe to sow rye, barley, or oats on affected land. Should the fallow be clean by the end of July, mustard or rape seed could be drilled and then ploughed in for the wheat crop. The same applies to land cleared of early potatoes."

Professor Gemmill of University College, Dundee, is at present working on this insect, but his work is not yet completed. Mr F. R. Petherbridge[2] has published some very interesting experimental work. From infested wheat plants brought into the laboratory flies were bred out, and were placed in a large glass jar whose open end was covered with muslin. Artificial food was provided for the flies. A sponge was suspended in the jar, and on removal for examination a number of eggs had been laid in it. The flies were then placed in another jar with sifted soil in the bottom, and the females were "observed laying eggs, the ovipositor being inserted to its full length in the soil." In another experiment where sterilised soil was used one part was left bare, one part had ryegrass transplanted in it, and the remaining middle portion had wheat sown on it. The females were observed laying eggs on the bare fallow and in the loose soil between the wheat plants.

Petherbridge suggests as a result of his experiments and observations that in Britain the wheat bulb fly has one generation in the year (in Germany there are two generations and two in Tunis), the adults being on the wing in June and July, eggs being laid "in bare soil about one-eighth of an inch below the surface" in July, August, and perhaps September; that the eggs typically hatch in the next spring, although a hatching of some is possible in the previous autumn, and that pupation takes place in May.

THE PEA AND BEAN WEEVIL (*Sitones lineatus*).

This species is an enemy of other Leguminous plants besides peas and beans, which are its favourite food-plants; vetches are also destroyed, and to a less extent clover. Sitones is injurious both as adult and as larva. The adults eat notch-like pieces out of the leaves, beginning at the edge and eating round to the edge again, and also completely destroy young shoots. The larvæ live in the soil at the roots of the plants and destroy the root-nodules. There are several related species which have been confused with one another, and there is also some confusion regarding their food plants. Miss Dorothy Jackson[1] is at present working out the individual distinctions and their life-histories, and her experiments with, and observations on, *S. lineatus* have cleared up some doubtful points. The winter is passed in the adult stage, the shelter places being hedgerows, "long grass, stacks of pea straw, amongst the stubble of clover fields." In spring the adults come from their winter quarters, and do great damage to young peas and beans, the plants being in a very susceptible stage. Eggs are laid in May at the bases of the plants; the eggs need moisture for hatching. Miss Jackson's figures for the length of the egg, larval, and pupal stages are—eggs hatch in twenty to twenty-one days; the larva is full-fed in six or seven weeks; pupal stage, three weeks. The new generation comes away from August onwards. The beetles of the new generation do not proceed to pair and lay eggs in the same autumn, but feed to ripen their reproductive organs, and then, after wintering, the egg-laying takes place. Exceptionally some individuals pass the winter as pupæ.

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[1] Mr Warburton, Zoologist to the Royal Agricultural Society of England, recorded, in April 1920, a case of Wheat Bulb Fly maggot in winter barley from Essex.

[2] "Observations on the Life History of the Wheat Bulb Fly (*Leptohylemyia coarctata*)," by F. R. Petherbridge, in the 'Journal of Agricultural Science,' vol. xi., Part I.

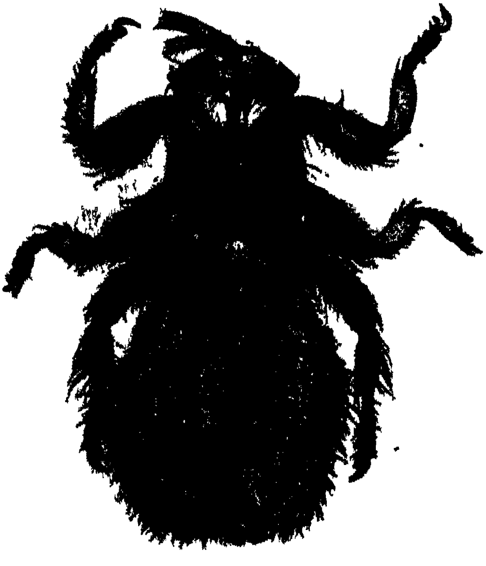

Fig 25 —Melophagus ovinus

From nature Magnified

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[1] "Bionomics of Weevils of the Genus Sitones Injurious to Leguminous Crops in Britain," 'Annals of Applied Biology,' vol. vii., Nos 2 and 3.

THE SHEEP KED (*Melophagus ovinus*) and the TICK IXODES (Figs. 25 and 26).

These two troublesome forms, though differing distinctly in external appearance and life-history, are always being confused. The confusion is due to the wide use of the common name Sheep Tick for *Melophagus*, which is not a true tick at all. In reply to many requests, I contrast the two forms in parallel columns :—

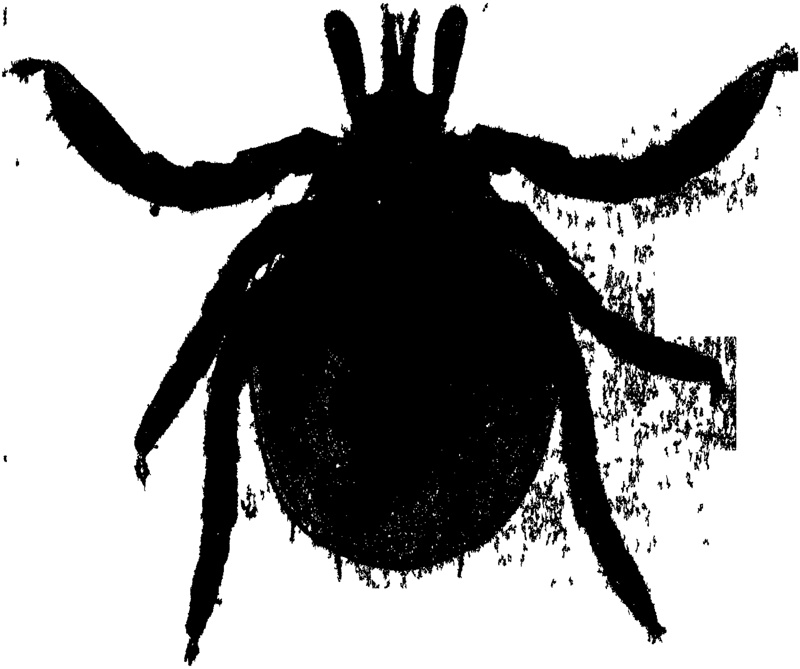

Fig 26 —*Larva of* Ixodes ricinus.

From nature Greatly magnified

Melophagus ovinus (the Sheep Ked or Kade).	*Ixodes ricinus* (the Sheep or Grass Tick).
Hosts—sheep and goat	Hosts—sheep, ox, goat, dog, horse, rabbit, hedgehog, mole, birds Man may also be attacked
Belongs to the Class of Insecta, and its body is divisible into head, thorax, abdomen.	Belongs to the Class Arachnoidea and the order Acarina or Mites Is divisible into a head (*capitulum*) and a body

Melophagus ovinus—contd.	*Ixodes ricinus*—contd.
The head, small and sunk in the thorax, carries two compound eyes, a pair of short antennæ sunk in cup-like sockets or pits, and the mouth parts. A tubular proboscis, used in piercing the skin and sucking blood.	No eyes. No antennæ. The mouth parts consist of—a pair of chelicerœ, rod-like, and ending in hook-like processes; and the hypostome, a prolongation of the head, ventral to the chelicerœ, and armed on its under surface with backwardly-directed hooks. The chelicerœ pierce the skin, the hypostome is introduced and buried and holds. There is also a pair of sheath-like palps borne on the basal part of the capitulum. The mouth is between the chelicerœ and the hypostome, and the blood of the host is pumped into the gullet and thence to the stomach by a suctorial pharynx.
Thorax consists of three segments and carries six strong legs, very bristly, and each with two strong sharp claws and a feather-like projection.	Body carries six (in the larva) or eight (in the adult) short legs, ending in small claws.
No wings.	No wings.
Abdomen flattened, narrowed in front and widened behind; tough; on each side of the abdomen are seven breathing pores.	Body has on under surface not far behind the head the genital opening; breathing pores beside the last pair of legs. The male has a shield which covers nearly the whole of the upper surface. The shield of the female is small, and covers only the front part of the upper surface.
The keds live among the wool, and pass their whole life on the host, migrating perhaps to another sheep when in contact, or passing, say at shearing-time, to lambs. They soon die if removed from the sheep on which they depend for warmth and feeding. The females do not put their eggs to the outside, but the egg hatches in the body of the mother into a legless, non-segmented maggot, which is nourished in the body of the mother. The full-fed larva is then put to the outside, and at once proceeds to pupate; the puparia are fixed to the wool. By a	The female lays her eggs—in great numbers—on the ground. The larvæ that hatch are six-legged, and have no visible breathing pores and no reproductive opening; they crawl up blades of grass and wait the arrival of a host animal; their patience must needs be great, for a long time may elapse before the required host passes; but they can subsist for long on a supply of reserve or yolk. When a host passes, the young ticks fix on, and then feed on blood. After feeding for a short time, the young tick drops away to the ground, and in a longer or shorter time, according to the external conditions, moults. It is now a nymph, with four pairs of legs, and with breathing pores, but not sexually adult. In turn, the nymph must reach a host, and after

Melophagus ovinus—contd.

month the ked issues from the puparium by an opening made at one end.

Ixodes ricinus—contd.

feeding drops away and a moult results in the adult males and females. These reach a host, pair and feed, and then the engorged females fall away and proceed to lay their eggs.

This tick is the carrier of the parasite which causes Redwater in cattle in Britain, and Stockman believes it to be also the carrier of the *virus* associated with Trembling or Houping-ill in sheep.

THE TURNIP GALL-WEEVIL (*Ceuthorhynchus pleurostigma sulcicollis*).

In the 'Transactions' for 1917 I gave some notes on this enemy of cruciferous crops. In early spring I received a consignment of savoys very badly infested with the larvæ. The accompanying Figs. 27 and 28, made from some of the material received, give a good representation of the appearance of

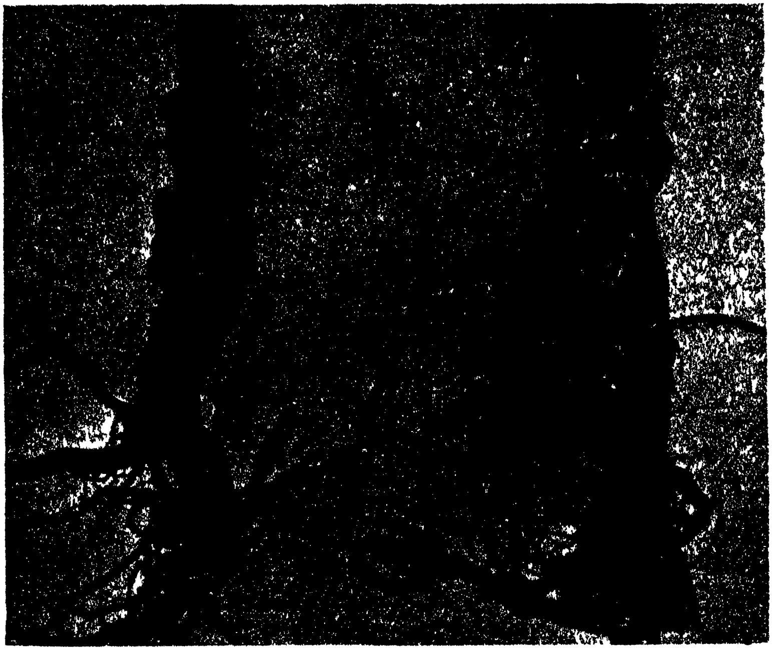

Fig. 27.—*Roots of Savoy galled by* Ceuthorhynchus pleurostigma.
Natural size. From nature.

attacked plants. The material was kept in the artificial temperature of my laboratory, and in the end of March and in April a large number of parasites issued, and many adult weevils. The swellings on the roots are sometimes confused with those due to Finger-and-Toe, a quite different parasite; but, apart from other differences, that the gall-weevil is the culprit is shown by the presence of the weevil grub inside the swelling when the gall or swelling is cut open. Each gall has its own grub.

Fig. 28.—*Section through root of Savoy to show galls and larvæ of* Ceuthorhynchus pleurostigma.

Natural size From nature

PLANT-BREEDING.[1]

By T. ANDERSON, M.A., B.Sc , Seed Testing Station, Board of Agriculture for Scotland.

THE term "Plant-Breeding," in the sense in which it is in modern times understood, signifies all the activities directed towards the improvement of species and varieties of plants along the lines of increased economic usefulness, whether as food, luxury, or decoration. This account deals with "plant-breeding" in its reference to staple agricultural products only, and is an attempt to trace the principles of improvement as they apply, directly or indirectly, to the common crops of arable land in Scotland. The quantity of produce derived from a field-grown crop, and the quality of that produce, must necessarily depend on a great number of extraneous conditions, of which the type of climate, the character of the soil, the intensity of cultivation, the provision of drainage, and the availability of plant food may be regarded as the chief. Every field crop is grown under more or less imperfect or un-ideal conditions, and in proportion as these conditions approximate to the ideal, so is the chance greater of developing, in a favourable manner, the qualities which make a plant species most profitable to the grower and most acceptable to the consumer. Hence the greatest development from the original in the improvement of plants is to be found in the specialities characteristic of market-garden produce and floriculture, and particularly among the species of plants which are maintained during cultivation in the even conditions which obtain under glass, where they can be given a perfect soil medium, and be entirely protected from the vicissitudes of changes of temperature, from differences in water content of the soil, and from attacks of fungus and animal parasites. It goes without saying that there are bounds to the improvement of any species which it is impossible to transgress. On the one hand, there is a limit to the intensity of cultivation and nurture, and on the other, to the capacity of a species for production even in an ideal environment. It is highly probable that numerous species have already been improved to that limit, and contain representative varieties which cannot be excelled when their cultivation is carried out under the best conditions.

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[1] Certain phases of this subject have already been treated exhaustively in previous volumes of the 'Transactions.' For the sake of continuity of context, repetition is made of some salient facts and views expressed in these articles—viz.: vol. xviii., 1906, "The Potato Crop," David Young; vol. xxii., 1910, "The Improvement of Cereals—Patrick Shirreff's Work," W. G. Smith; vol. xx., 1908, "Heredity in Plants and Animals," T. B. Wood and R. C. Punnett; vol. xx., 1907, "Experiments in Crossing Potatoes," J. H. Wilson.

When the experimenter enters the domain of staple products which are grown on large areas without special conditions other than those which are afforded by the relatively rough operations of drainage and cultivation and by the provision of suitable plant food, he must temper his ideals accordingly. He cannot work for the improvement of a particular part of his plant without taking into account the effect that environment may have on other parts: he must improve his plant *in toto*. He has always to be content to strike a compromise with nature, and to reduce his ideal for any particular feature to the maximum improvement that will balance with an adequate maintenance of those features of other portions of the plant's economy, by means of which it accommodates itself successfully to the conditions in which it is grown.

Nor is the problem of the improvement of a particular species always the simple expedient of discovering a variety which will develop best under the best conditions. The range of the profitable cultivation of any species is limited by the influence of climatic and geological factors; the range of a variety is regulated by economic considerations of the established type of profitable agriculture in particular areas. Consider, for instance, the range of the cultivated oat. For the highest production, relatively thick-skinned varieties with a high-yielding capacity and with strong stiff straw, such as the Abundance or Propsteier type, are utilised in the areas best suited for the profitable cultivation of the oat. In these areas the production of grain is the most important consideration. In northern latitudes and at higher altitudes, preference is given to varieties producing a greater abundance of straw and a fine quality of grain, as, for instance, "Dala" in Northern Sweden, and "Potato" in the areas of mixed husbandry of Great Britain lying out of the main grain-producing districts. In the stiff clay lands of the north-east and south-west of Scotland, the "Sandy" or the "Tam Finlay" types give the best average return; while in very outlying districts wild oats (*Avena strigosa*) are still cultivated. The wild types are also found on the southern fringe of the range of the species both in America and along the Mediterranean basin, where there are cultivated types developed from *Avena brevis* and *Avena sterilis*. The more a variety is accommodated to special conditions, the more limited is its range. The borders of the range of a species are indicated by varieties which have some special quality of hardiness in respect of capacity to withstand one set or another of unfavourable conditions, while in the area of the most intensive culture there are found highly-specialised varieties which exhibit extreme productiveness. Selection, discovery, and introduction have in the past extended the range of profitable cultivation of a species, and at the same time have improved the character of the species in the area of intensive cultivation. Thus, while it is important to improve and perfect the character of the type of what may be termed the *omnibus* varieties, it is a matter of no less consideration to find means of improving, or of finding improved substitutes for, varieties which in virtue of their special qualities are economically important in enabling the maximum range and degree of successful cultivation to be maintained.

ORIGIN OF CULTIVATED SPECIES.

The original form of many species is pretty well known or may be readily assumed. Indeed, some species cultivated for their vegetative parts have a limited plasticity, and are not far removed from the wild condition ; but there are many cultivated varieties of which the wild prototype is unknown. Such are the cereals. It is important to note that experimenters have demonstrated that cultivation as well as selection may have something to do with the change of character which has occurred in the building up of a species to a state of economic importance, and it is probable that the earliest developments from the wild form to the artificial variety were the outcome of cultivation and selection combined. Most of our cultivated cereals could not survive if they had no artificial conditions provided. It is undoubted that many of the ancient civilisations represented a mentality of as high a standard as is to be found in modern civilisation, and one cannot but think that, though limited by the paucity of knowledge and want of guidance from the experience of others, the earliest cultivators in these civilisations appreciated the possibilities of advance, and practised selection of notable plants to build up specially prolific crops. The earliest records of the practice of selection go nearly as far back as the records of cultivation. According to Darwin, the improvement of rice by selection was practised in China thousands of years ago. The Romans cultivated wheat, spelt, corn, turnip, cabbage, and beans for human consumption, as well as the leguminous fodder plants as food for stock. The era immediately preceding the extinction of the Western Roman Empire was one of great progress in the systematic and scientific cultivation of the soil. Mention is made in Virgil of the intentional saving of the best grains from a crop for the succeeding sowing, in order to prevent the type from deteriorating, and it is probable that the process of selection to which he makes reference was a kind of mass selection.

In mediæval times there are few records of agricultural developments, and the continuance of the experience of cultivation was probably carried through to modern times in small areas outside the main avenues of warfare.

PRE-MODERN IMPROVERS.

It was not till towards the end of the eighteenth century, however, that systematic breeding of crop plants was practised. Van Mons is cited by Bailey [1] and others as one of the most important pioneers in modern crop improvement. His interest was largely directed towards the improvement of fruits, and of these he originated many important varieties.

After a period of great scarcity during a series of bad years at the end of the eighteenth century, and possibly as a consequence of it, systematic breeding was practised by several improvers who have left an account of their work as well as results in concrete form.

Previous to the development of concerted systematic effort of modern days, the interest of individual improvers was largely directed to one species, or at most to a few allied species. Hence it will be convenient to take an account of the development of groups of economic plants separately, and to concentrate attention in the first instance on the cereals.

BREEDING OF CEREALS.

The men who are commonly accorded notice by authorities on the history of plant improvement in the early part of last century as pioneers of plant improvement in Britain are Thomas Knight, John Le Couteur, and Patrick Shirreff, and in the years immediately preceding the period of agricultural depression towards the end of the century, Shirreff and F. F. Hallett.

Knight was a selector and hybridist who introduced varieties of wheat which proved exceptionally hardy and weathered with success the years of wheat failure which occurred towards the end of the eighteenth century.

Le Couteur was, according to De Vries,[2] the first to discover and to practise the principle of single-plant selection. Having had his attention directed to the lack of uniformity of the crop through the presence of numerous and diverse forms existing in one of his fields of wheat, and having it suggested to him that many of the forms would be of inferior value, he set to work to extract the various forms, and, for their perpetuation, to grow them in separate cultures. He found that in this way he could procure uniform cultures, and was successful in isolating a large number of diverse forms some of which were put on the market as new varieties. One of these, "Bellevue de Talavera," retained its reputation for the best part of a century as a variety of exceptional properties and stability of type.

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[1] L. H. Bailey, 'Survival of the Unlike.'

[2] 'Plant-Breeding,' H. de Vries.

In assessing the value of the work of the early selectors, it is of interest to refer to 'Scottish Vegetable Products,' published by Messrs Peter Lawson & Son, pioneers of the agricultural seed trade, as a record of their exhibit at the Great Exhibition of 1851. Even in the meagre account of the activities of the early improvers of cultivated cereals and of the history of many varieties which is there given, we find abundant evidence that very large numbers of agriculturists were interested in the improvement of varieties of all types of agricultural produce. The method of building up a new variety of cereals from the produce of a single plant seems to have been so well known as to call for no special comment: the fact that such a selection would breed true to type was simply accepted. The admixture of types which characterised commercial cultivated varieties was recognised, and the attempt to improve matters, both by introducing or selecting varieties suitable to the climate, and by raising pure stocks, is distinctly indicated in the records in the compilation quoted. Of "Hunter's White Wheat," for example, the author says it was "named in compliment to the late Mr Hunter of Tynefield, East Lothian, who first discovered it growing in a field on Coldingham Muir, Berwickshire. This wheat is the most extensively cultivated of any genuine or unmixed variety in Scotland."

From the frequent mention of the names of "discoverers" in the East of Scotland during the first half of the nineteenth century, it may be taken that the search for new and improved types of wheat, barley, and oats, and the multiplication of pure types when discovered, was a matter of ordinary practice with many agriculturists. Lawson mentions the names of twelve men who "discovered," "raised," or "selected," from single plants of wheat, strains which were grown in Scotland in the middle of the nineteenth century, many of the varieties being obviously "foundlings." Apparently the best of these selected strains was "Hunter's White" which in these days occupied the position of the standard wheat in the Lothians. Besides Hunter, successful Scottish selectors appear to have been A. Gorrie of Annat Garden, near Perth, who raised Annat Barley, a single plant selection, as well as several selected varieties of wheat; and Brodie of Ormiston who "discovered" the variety "Brodie's" or "Ormiston," which variety, after being grown in England, was reintroduced into Scotland as "Oxford Prize." The activities of that generation of experimenters are typified in the work of Patrick Shirreff of Mungoswells (1791-1876), one of the successful producers of new varieties of wheat and oats, of whose work in raising productive varieties there remains an authentic record. While Le Couteur was in principle selecting from the point of view of isolating strains out of standard types and at the same time selecting striking plants of types foreign to the standard, all Shirreff's earlier selections and many of his later introductions were, like those of his contemporaries, simply "discoveries" or foundlings, outstanding novelties differing from the main type of the crop from which they were selected. The selective principles of the two men were thus essentially different.

Nevertheless the variations in standard varieties were recognised in Shirreff's time, for "Hopetoun" wheat (1832), a "discovery" which was multiplied by Shirreff, was recognised as "an improved strain" of "Hunter's White." During the first period of his selections to 1832 Shirreff isolated only five special plants, and it was not until experience had indicated to him the comparatively large difference which existed between worthy and unworthy strains within the same variety that the idea occurred to him of attempting to isolate the profitable strains. He never departed from his search for novelties; and his later selections also included discoveries of plants distinct from the type in which they were found —*e.g.*, "Bearded Red Wheat," which, though recognised as a strain of "Old Red Lammas," was selected from a crop of "Hunter's White." Shirreff's system of competitive trials of his selections and his method of rapid multiplication after selection foreshadowed the system in vogue at a later period when more concentrated attention and systematic energy were lavished on the work by many experimenters. While most of his varieties are now out of cultivation, many of them —*e.g.*, "Mungoswells Wheat" and the "Hopetoun Oat"— had a great reputation in their day.

The system of amelioration practised by F. F. Hallett was more laborious and exact than that of the two aforementioned breeders, his being a system worked on a rule-of-thumb method following a preconceived idea. His method was to select the best grain of the best ear from the most outstanding plant and to continue to do this for several years from the annual progeny of his first-selected grain. Further, he forced the yield of his selections by intensive culture until the capacity to yield attained a maximum, gauged by the production of an ear with an excessive number of grains. His was thus the Lamarckian conception of inducing variation in the direction of higher yield by always choosing the best plant, its heaviest ear and most perfect grain, and continuing to foster the capacity for yield by providing the opportunity for the maximum increase in the desired direction.

A corollary to his principle was that the selection, to be of any value, had to be maintained, and that the seed of his specialities had therefore to be obtained directly from the stocks which he personally raised. Many of his pedigreed stocks were failures, and it is probable that such as were successful owed their popularity to the intrinsic value of the primary selections rather than to the effect of his method. In view of the results obtained by Shirreff and Le Couteur, it is probable that Hallett discarded much valuable material and wasted much time in perfecting his pedigree varieties.

Contemporaneously with the later work of improvement by Shirreff in Scotland and by Hallett in England, workers in other countries had been successfully engaged in the improvement of cereals. In France the Vilmorins had been working on the improvement of various types of agricultural plants. A. de Vilmorin showed how it was possible by selection and cultivation to improve the wild carrot in a few generations to a state of perfection comparable with the cultivated type. Louis de Vilmorin gave his attention to the improvement of sugar-beet (about 1843 and subsequently) and developed the principle of the progeny test and of line selection for cereals which had been utilised by Le Couteur and which was being simultaneously used by Shirreff. From 1836-56 he accumulated a collection of certain varieties of wheat which was maintained in cultivation for fifty years and showed that in the case of single-plant selections continuously grown year after year there is a perpetuation of the characteristic features of the original selection without apparent change.[1] The method of selection has accordingly been known on the Continent as the "Vilmorin Method."

At the same time a different principle of improvement was being exploited among breeders in Germany, namely, the principle known as *mass selection* which was for generations the authoritative principle used in the amelioration of crops grown in that country.

The German breeders did not accept the principle of the single selection as sufficient. Their main idea was to preserve all that was useful in a variety and by a process of continuous selection to increase the degree of intensity of any useful character. To them a single selection represented but a small part of the valuable qualities of a variety. These valuable qualities they considered ought to be maintained and enhanced in their entirety even at the expense of uniformity.

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[1] Haagedoorn, Journal of the Board of Agriculture and Fisheries,' 1914.

It was assumed that the cultivated varieties with which they worked were in a state of variation in diverse directions and that they could be developed along a desired avenue by continuous selection of those forms which approximated to the preconceived ideal. In practice the principle was put into action by the selection year after year of large numbers of ears (in the case of a cereal crop) which showed the necessary modifications and were typical of the variety from which the selections were made. The supposed natural principle on which this method was based was the accepted one of the continuity in heredity of small variations.

The following are extracts from De Vries' account of the method employed by Rimpau—one of the most noted of the German breeders—in improving rye :—

" This race (Schlansteder Rye) had been started by Rimpau in the year 1867. At the time of harvest of that year he inspected a large number of his rye fields and selected all the ears which seemed to him to surpass the others. He brought home a handful of them, repeated the trial and mixed their seeds. . . . The seeds were sown the next year and in the harvest the same selection of the best ears was repeated. Each year in the same way the best ears were chosen for the continuance of the élite strain and, after the exclusion of all ears of minor value, the remainder were sown in a field and multiplied without further selection in order to produce all the seed required for the sowing of the whole farm. It took three or four years to reach this quantity. The élite of his new rye was sown out on a small parcel surrounded by cultures of vegetables and other plants not belonging to the cereals . . . sufficiently removed from the neighbouring fields to ensure it against possible contamination by pollen of other varieties." This precaution was necessary as rye is cross fertilised.

" After twenty years of continued selection this élite strain was so much improved as to produce a race distinctly richer than the ordinary varieties of rye in Middle Germany."

The basic principle in this type of breeding is the same as that which was adopted by Hallett, but Hallett's method of application was different. The German breeders applied it to the mass of the plant variety with which they worked; Hallett applied it to single selections of outstanding merit. Both methods were laborious and laboriously followed. They both reached the same goal as the empirical selectors ultimately; Hallett, because the quality of certain of his selections depended on the virtue of his initial choice; Rimpau, because the assiduous attention which he paid year after year to his élite forms succeeded in finally reducing the heterogeneity of his first mass selection to a condition in which there remained only one type and that type the best of forms which he had originally selected.

The principle has much in it that is true. Applied to the amelioration of the sugar-beet on the basis of chemical analysis of selected roots, it has had exceptional results. Louis de Vilmorin first applied it to this species and, up to the time that it was superseded in favour of single selection, it brought about a tremendous increase in the average acre-yield of sugar. The success of this selective method depends on the maintenance of a high potentiality for productivity along with the best conditions of propagation. Its employment together with the development of a higher intensity of cultivation was responsible for a marvellous improvement in the productivity of staple crops in Germany, as is evidenced from the following statistical extract :—

AVERAGE YIELD OF CROPS IN GERMANY (per acre), (1877-1908)

Years	Wheat	Rye	Barley	Oat	Sugar Beet		Potatoes	Hay
	(bush of 60 lb)	(bush of 54 lb)	(bush of 55 lb)	(bush of 42 lb)	Roots (tons)	Sugar (cwt)	(tons)	(cwt)
1877-88	19 92	16 12	21 10	24 13	11 9	25 1	3 2	23 6
1889 98	21 81	18·46	24·13	25 90	12 1	30 3	3 7	25 2
1899 1908	28 70	25 89	30 37	37 84	11 7	35 2	5 3	25 5

It was largely on the evidence of the results obtained by its employment that Darwin stated the principle of continuous variation of living things in particular directions, and on it based his theory of natural selection.

LATER SELECTORS.

During the last decade of the century, work in plant-breeding which was to give the agricultural world definite proof of the true general facts of variation in cereal crops and show the way to the best means of improvement was carried on in two stations, the one in America, the other in Europe. In 1888 W. M. Hayes set to work to improve the quality of the wheat crop in the State of Minnesota. Instead of applying any empirical mode of judging his selections by their appearance of quality when first selected, he judged them by reference to the average quality of their progeny. For the purposes of this judgment he invented the "hundred plants to a plot" system in which each selection is represented by a hundred sown seeds. Testing in this way he found his selections uniform and the best of them much in excess in yield of the mixed crop from which they had been selected. His selections were made mainly on the basis of yield and those which he distributed proved in this respect to be a great advance on the ordinary commercial varieties.

In 1886 there was founded at Svalöf, in Sweden, the station which is now world-famous. It owed its inception to a group of agriculturists who formed an association for the cultivation and improvement of seeds in Southern Sweden. This association soon after became the General Swedish Seed Association which in 1894 absorbed the Central Swedish Seed Association founded in 1889 for similar purposes. Agriculturists had been forced to combine for the betterment of their industry the main backbone of which had been their trade in the supply of seed grain to other countries from about 1840. This trade had fallen into a state of decay, both on account of the exhaustion of the grain lands and because the money value of the European grain crop was reduced by the competition of American grain.[1]

A main experimental institution was established at Svalof. This institution concerned itself only with the production of improved races: these when discovered were handed over to the Company for development, distribution, and exploitation. The system of breeding at first employed was based on the German system, one difference, however, being that the élite strains were grown in ordinary field conditions and not in special culture like those of Rimpau or Hallett. Working with races imperfect in point of uniformity, the Institute made a considerable improvement on the general average quality of the crops of barley, wheat, and oats in South Sweden, the first improvements being relatively uniform varieties of "Chevallier," "Prentice," and "Plumage" barleys, "Black Tartarian" and "Swedish (Propsteier)" oats, and a hardy mass strain of "Squarehead" wheat. Activities were afterwards directed to the betterment of the leguminous crops. The result was on the whole disappointing. Chiefly by accident but partially as a result of meticulous attention to recording, H. Nilsson, the second director of the station, discovered afresh in 1891 and 1892 the principle of single-seed selection accepted without comment by the early selectors and shown by Vilmorin to be the quickest method of obtaining a pure and uniform strain. This method of single-plant selection whereby all the botanically different forms in a crop were isolated and compared, the best being chosen for multiplication as a pure and uniform type, was henceforth followed. The system of mass selection was retained as a working method because it was still thought to be necessary to the perfecting of the pedigree selections. At the same time artificial breeding

[1] L. H. Newman, 'Plant-Breeding in Scandinavia'

was commenced, but in view of the excellent results attained by the rediscovery of the system of single-plant selection little attention was paid to it at first.

THE EARLY HYBRIDISTS.

In order to bring the evolution of ideas on variation to the point at which they emerge as clear-cut facts of immense importance to agricultural breeding, it is necessary to go back and consider the work of the hybridists.

Reference has already been made to Knight as a hybridist. Exhibits of hybrid varieties of wheat were shown at the Great Exhibition of 1851. In 1870 experiments in wheat-breeding were commenced by C. G. Pringle of the State of Vermont, U.S.A. He accomplished several crossing operations between two varieties of wheat and found the plants of the first generation showing great uniformity of character. He noted that in two respects these plants partook strongly of the character of the pollen parent and in another respect the character of the seed parent. In the second generation he found endless diversity of forms, but by continuing selection he had in four years succeeded in fixing the character of several varieties. A. E. Blount was another American investigator who obtained similar results with similar material. Henry de Vilmorin started experiments in wheat-breeding in 1873 with a view to combining in one form a stiff straw with a high grain-carrying capacity. His experiences were similar to those of Pringle and he found four to five years'—sometimes six to seven years'—selection necessary before any crossed form was sufficiently " even and fixed " to be sent out on trial.

In 1871 Shirreff produced his " King Richard " wheat, a cross between his " Bearded White " and " Talavera," made with the object of increasing the size of the seed of the former variety by mating it with the full-grained Spanish strain. In and after 1888 Dr Wm. Saunders, then Director of the Canadian Government Experiment Farms, introduced several of his wheat hybrids on " Red Fife " and " White Fife," and shortly afterwards, in 1892, the two younger Saunders originated the well-known hybrid " Marquis " wheat.

The later selectors, Rimpau, Hays, and Nilsson, all experimented with crosses, but in the absence of a guiding principle for the utilisation of hybrid material they regarded the experiments as not so important as the following-out of the known principles of selection.

The two most famous names associated with the production of cereals by means of variety hybridisation are those of John Garton and Wm. Farrer. The work of Garton and his successors is an outstanding example of what can be done in the improvement of plants as a commercial proposition unassisted by public funds, while the results obtained by Farrer furnish a like example of what can be performed by the aid of public subsidy.

John Garton.—In 1880 were commenced at Newton-le-Willows the famous experiments in the hybridisation of cereals which have resulted in the population of the grain-growing districts in Britain by the Garton varieties.

Garton first set himself to prove to his own satisfaction whether or not the cereals were cross-fertilised in nature. For the purposes of this information he removed from several florets in a number of heads of wheat the immature anthers, thus emasculating these flowers. The other florets were left intact. The ovules left in the flowers from which the anthers had been removed had thus every opportunity of fertilisation from the pollen of other flowers on the same and on other plants in close contiguity. In no case in which the anthers had been removed did a seed form. This was taken as conclusive evidence that cross-fertilisation was non-existent in the cereals. For several seasons afterwards cross-fertilisation was attempted but without success. After repeated experiment the desired result was obtained. Close observation showed that as the consequence of crossing "hundreds of different types, perfectly distinct in form and character, are created season after season, until the reaction set up through the medium of cross-fertilisation becomes exhausted by repeated sowings. In some instances the sportive tendency has become inoperative by the fifth season from the time the grain was first sown, whilst in others it has continued for ten or twelve years."[1] Sporting of the progeny was taken as evidence of hybridity. The principle of selection employed by Garton was a comparative one. No attempt at selection of a hybrid was made for the first five to ten years. About a hundred of the best plants resulting from the crop, when its individuals were considered to have reached a state of stability, were selected and the seeds of each sown separately. Careful comparative tests were made of these selected hybrid strains and three or more were finally selected.

The particular purpose of Garton was to produce improved yield, earlier maturity, and greater strength of straw in cereals by forming new breeds. Large numbers of varieties were crossed together and multicrossed. In order to enlarge the scope of the work and to provide material for obtaining all the useful combinations possible, a collection of some five hundred varieties of cereals alone was made from all parts of the world.

The first commercial introductions were the "Abundance" Oat and "Standwell" Barley in 1898. Each succeeding year has brought new and improved breeds of oats, barley, and wheat on the market by Gartons, many of which, as "Abundance" and "Yielder" Oats, have found a permanent place in our agriculture. The operations of the firm of Gartons, Ltd., have extended to all forms of farm produce since then, but it was the success of their first introductions that woke the agricultural world in Britain and in Europe to the possibilities underlying careful exploitation of variety hybridisation. Garton's attention was particularly attracted to oats, the staple cereal of the islands, and it has been in this direction that his success has been most appreciated in Scotland.

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[1] T. R. Garton in the 'Journal of the Farmer's Club,' 1900.

Wm. Farrer.—To W. Farrer, the pioneer of wheat-breeding in Australia, is generally conceded the position of the premier of all practical wheat hybridists. Untrammelled by any considerations of dogmatic principle, he followed the same method as has been adopted by Luther Burbank [1]—viz., he multiplied his material to obtain a tremendous abundance from which to select and trusted to his own intuition and to the assistance of nature to point out the best. The problems which he set himself to solve were probably, in all the circumstances, insoluble and consequently his method was wasteful, even if it were prolific in results. For some twelve years previous to 1898 he worked at his problems privately. In that year he was appointed Plant-Breeder to the Department of Agriculture, New South Wales. During the next eight years some 2262 separate crosses were performed, the total for nine seasons' work. His aim was "to make varieties or strains of varieties to suit all districts of our interior—the hottest and driest included—and to produce grain which in grading can be placed in either one or the other of two different classes, (1) varieties with all characteristic excellences of the very best of the old South Australian sorts, but yielding stronger flour, (2) varieties which are equal to the very best grown in Minnesota or Manitoba in flour strength but with mellower grain and of better appearance." [2]

Besides these, Farrer worked to produce varieties resistant to rust, bunt, and drought. The criteria of hardiness in these respects had to be reached by all the hybrids to enable them to qualify for further selection. In his endeavour to combine milling quality with yield he was fairly successful, though many of his "quality" varieties have been comparative failures on account of their shortage of yield. His work has, however, placed the growing of wheat in New South Wales on a high standard as compared with that in the other Australian States.

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[1] Luther Burbank, the American horticulturist, born in 1849, is the most versatile of practical hybridists. His first success was the Burbank potato which since its introduction has been the standard potato of the Western United States: he has also introduced improved hybrid varieties of wheat; but his fame is chiefly that of a raiser of wonderful varieties of plums and other fruits, in the selection of which he is credited with an exceptional gift of intuition, and that of a creator of surprising novelties such as the spineless bramble, the stoneless prune, the seedless apple, the spineless cactus, hybrid walnuts, and other hybrid trees. His methods of elimination are ruthless: De Vries records that "in one year he burned up 65,000 two- and three-year-old hybrid seedling berry-bushes in one great bonfire and had fourteen others of similar size."

[2] J. T. Pridham, "The Breeding of Wheat," 'N.S.W. Agr. Gaz.,' Aug. 1919.

He also adopted the method of multiple crossing, but, unlike Garton and his successors, he did not hesitate to use unfixed types for this purpose. His aim was to get results rapidly, and, in working for the end in view, his effort was to obtain the largest possible number of combinations and hybrid forms from which to select. In consideration of the multiplicity of his material, it was impossible for him to proceed on lines scrupulously exact, and his productions have been criticised by the Australian farming community as being unfixed in character. It is improbable, in view of the large number of new types with which he inundated New South Wales, that these types were all of the stability of character which the farmer might prefer; but Farrer's work and that of his successors was nevertheless of the greatest value to the wheat-growing districts of New South Wales.

His four best varieties, "Federation," "Come-back," "Bomen," and "Canberra," and the variety "Hard Federation," isolated from his material subsequent to his death in 1906, have become standards of excellence in the State.

THEORIES REGARDING HEREDITY AND VARIATION.

To those interested in questions as to the nature of heredity in plants, as well as to those concerned in the improvement of them, the advent of the twentieth century was signalised by the wide publication of accounts of three independently conducted sets of experiments on whose results were based three theories, all interdependent and complementary, and bearing directly on the facts of variation and heredity. These were the *pure-line theory* of Johannsen, the *theory of mutation* of De Vries, and Mendel's law concerning the distribution of parental qualities in the offspring of plants.

Pure Lines.—Johannsen's pure-line theory, shortly summarised, is that inbreeding of self-fertilised plants produces a condition of stability or fixity. The results of his researches explained much that had been obscure to selectors and hybridists alike. He analysed the composition of plant populations by a study of individuals in respect of certain particular characters and followed the transmission of these characters through several generations. He found that individuals composing a variety of a self-fertilised species are not alike in respect of average values; that a variety is a congeries of essentially dissimilar individuals in this respect, that their dissimilarities—measured in terms of average expression in the progeny—are reproduced among the descendants of these individuals; but, nevertheless, that these inbred descendants reproduce always on the average the character of the parents; that no method of selections will alter this average more than temporarily and that the range of temporary variation within a pure line is frequently as great as the range of variation in a variety. His theory of the pure line in self-fertilised species was supported by and explained the "pedigree culture" principle, particularly of Nilsson at Svalöf.

"*Sporting.*"—But if there are so many varied individuals within a variety and each individual breeds true, there are here two assertions diametrically contradictory. De Vries furnished an explanation in his theory of mutation. His experiments proved to him that all change in the character of varieties was due to sudden sporting and that these sudden sports perpetuated the newly assumed characters in a fixed condition in their offspring. Johannsen found this occurring occasionally, though not frequently, in his pure lines.

Mendel's Law.—A further explanation of variation is afforded by Mendel's law.[1] Shortly stated, Mendel's law affirms that if two varieties, which differ in respect of one pair of complementary characters, are crossed, the first generation will take the form of the parent bearing the dominant character, and that in the second generation the progeny will segregate in such fashion that it will be composed of 25 per cent of individuals like one parent, 25 per cent of individuals like the other parent, and 50 per cent of individuals of the composition of the form obtained in the first generation. This means that in the second generation half the products of hybridisation have returned to a condition of stability or fixity in terms of the character of one or the other parent, while the other half still remain in an unstable condition. The unfixed progeny of the second generation will follow the same rule of segregation in the third generation, that of the third in the fourth, and so on. Thus, if the whole progeny of the particular hybrid in question is sown year after year for five generations, the proportion of fixed and unfixed forms in each generation is as follows :—

In the	1st	generation	. . .	all unfixed.	
,,	2nd	,,	$\frac{1}{2}$ fixed	$\frac{1}{2}$	,,
,,	3rd	,,	$\frac{1}{2}+\frac{1}{4}$ fixed	$\frac{1}{4}$	,,
,,	4th	,,	$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$ fixed	$\frac{1}{8}$	,,
,,	5th	,,	$\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}$ fixed	$\frac{1}{16}$	,,

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[1] Mendel's account of his discovery was published in 1865 but was neglected until 1900 when his paper was rediscovered.

The selector from this mixed progeny of the fifth generation, consisting of $\frac{15}{32}$ of one parental type (stable), $\frac{15}{32}$ of the other parental type (also stable), and $\frac{1}{16}$ of unstable forms, would have a 15 to 1 chance of selecting a fixed type. But as it is assumed that in this instance the parents only differed in one pair of characters, the selector would be no better off than he was at first as he would merely be able to extract again one or other of the parent types.

If, however, the parents differ by two pairs of Mendelising characters, these characters commonly segregate independently and form new combinations, and the proportion of fixed and unfixed forms is such that in the fifth generation approximately $\frac{7}{8}$ of the resultant progeny would be stable and 50 per cent of this $\frac{7}{8}$ would represent new combinations. If the proportions be worked out for a larger number of pairs of Mendelising characters, the diminution of unstable forms will be found to occur less rapidly, but for almost any numbers of pairs of characters stability will become almost entirely attained by the tenth generation.

It is curious that the three rules of heredity on which the modern worker bases his chances of improving annual species should have come to the notice of the scientific world almost simultaneously. The law of stability of pedigree selections or pure lines established by Johannsen, the conception of the common occurrence of mutation or sports, emphasised by De Vries, and Mendel's law are complementary, and, while combined, they do not furnish a complete philosophy of heredity within the limits of a single species, they do provide and have provided an excellent working hypothesis for scientists who desire to exploit the potentialities of cultivated plants in the general interests of agriculture.

Supported by the experiences of Shirreff, Pringle, Vilmorin, Hays, Nilsson, and Garton, these dicta with modifications have served as a testament of authority for the modern generation of breeders. The combined theories explained practically all the anomalies which puzzled investigators dealing with variation. They formed a solid basis on which to proceed. They established certain tenets concerning variation and hybridity which are outlined as follows:—

Variation.—1. Its cause may be traced to changes in the germinal constitution of the organism (permanent hereditary variation), or to combination and redistribution of characters in crossing (hereditary variation), or to changes induced in the individual by differences in environment (temporary variation).

2. Its expression is found in differing individuals of a plant population, individuality being measured in terms of the average values of the characters in successive generations.

Variations may thus be classified into transmissible or hereditary variations, and non-transmissible or temporary variations.

(*a*) Non-transmissible variations are those variations which are not reproduced in the descendants—fluctuations, unstable and unfixed, due to differences in the environment (*e.g.*, light, plant food, soil conditions, availability of water, &c.), but sometimes capable of being maintained in reproduction by maintaining the same environment.

(*b*) Transmissible, unfixed, or unstable variations—reproduced in greater or less degree in the descendants: variations due to crossing.

(*c*) Transmissible, fixed, or stable variations—fixed sports and homogeneous forms derived from segregation after cross-fertilisation.

Plant Populations.—The above classification of the variations which may arise in the course of the multiplication of a variety affords a means of analysing the crowd of divergent individuals that compose a standard type of cereal crop and of explaining the reason of their obvious divergences. Leaving out of account impurities occasioned by accidental admixture with other individuals of a different variety, the differing individuals may represent ephemeral non-hereditary differences due to inequality of conditions; stable hereditary differences due to essential change; or fluctuating hereditary differences, due also to essential change with or without the intermediary of chance cross-fertilisation. In a normally self-fertilised cereal crop the latter class of difference is probably somewhat rare.

Selection.—Many of our old standard cereals are certainly foundlings and there is little doubt regarding their having been multiplied from one original individual specimen. The "Potato Oat" was found as a single plant in a field of potatoes in Cumberland in 1788; the "Sandy Oat," probably itself a derivative, according to Lawson, of "Brodie's Red Oat" or "Lord Chief Baron's Oat," was developed from a single specimen found in Aberdeenshire in 1825; "Chevallier Barley" was a single plant discovery in 1823; and "Goldthorpe Barley" was developed from a rogue in "Chevallier Barley." One may be permitted to assume that the variation in height, strength of straw, time of maturity—to mention obvious points of difference—which is apparent to the casual observer in crops of these varieties and which has been the subject of selection from time to time, must indicate utility values in individuals which have been in the direction of deterioration as well as in that of progress. If any improvement is to be made on an old type, it can most surely be done by isolating the advanced types and discarding those that have deteriorated. In estimating the values of his selections the plant-breeder generally uses the axiom of the show-ring that there is only one best. The basis of selection of the early breeders was experiential. Attracted by evidence of special qualities of one kind or another, they selected their plants by intuition and trusted that the special qualities of the selections would be transmitted. The researches of Johannsen established, however, that it is necessary to verify the intuitive judgment by reference to the average quality of the progeny. Average plants in a mixed population may be more worthy precursors of a new variety than outstanding ones whose apparent exceptional qualities may be due to fortuitous circumstances. Hence it has become an accepted principle of breeding that average plants as well as particularly promising ones should be selected for the preliminary comparative tests.

Inbreeding.—In order that a useful form may be multiplied and kept uniform it must be inbred. Inbreeding is frequently assumed to lead to degeneration. But in assessing the possibility of resultant degeneration, it is necessary to take into account the normal processes of reproduction in connection with the particular species to be considered. Among plants, seed production does not follow the same chain of circumstances for each species. Some species are such that mating between two separate individuals is necessary for seed-production; others are such that cross-mating rarely occurs. In the case of our common cereals—wheat, oats, barley—each plant is self-sufficient for reproduction purposes: it is normally self-fertilised or inbred. This being a normal rule of nature for these species, it is reasonable to assume that inbreeding will have no effect in causing deterioration, and, as a matter of plant-breeding practice, this assumption has proved to be true. Inbreeding concentrates the special characteristics of the inbred subject and establishes and maintains the uniformity of these special characteristics. The natural fact of variation within a species or variety thus provides the possibility of advance and the act of selection is the first step in effecting improvement which is completed by the isolation of the progeny of the selected individuals, their multiplication by inbreeding, and by the comparison of these with each other and with the mixed parent type, the process of comparison providing the final proof of the adequacy or nullity of the selective operation.

The selection of single plants of the cereals above mentioned and the isolation of plantings of their progeny thus result nearly always in the establishing of a sub-race which propagates by seed true to the character of the parent plant and without apparent variation except the ephemeral variation which is the consequent of differences in the conditions of nurture.

Hybridisation.—Hybridisation is outbreeding. The result of crossing two varieties is the production of a large number of dissimilar forms. Hybridisation has always been considered a means of creating variable material for the purposes of selecting new combinations and as a means of creating new forms. The variable material produced was as often as not the despair of the earlier hybridists: only those who had the pertinacity to continue to experiment with it eventually discovered forms which were stable in character. Pringle, Vilmorin, Blount, and Garton all discovered the rule of eventual stability of hybrid types (recombinations) which follows as a corollary to Mendel's law and found that the advantages of outbreeding were only to be realised to the experimenter if he subjected his material to a course of inbreeding for a number of years.

The generally accepted dictum founded on the *law* is that there is no actual creation of new types to be expected in hybridising; that only recombinations are found. In order to obtain a useful combination of characters it is essential that the parent types should be proven by analysis in pure lines to be individually stable in respect of the characters the experimenter is wishful to combine.

Provided that the characters in question are subject to the *law*, the experimenter may then expect to get a desired combination, fixed and uniform, in the second or third generation. The essential fact of Mendelism which is of interest to the breeder is the fact of segregation of unit characters according to a system which, if its details are not too complicated, affords the experimenter the means of classifying at an early stage the material derived from a cross and of analysing his final results.

THE TECHNIQUE OF SELECTION AND INBREEDING.

The Progeny Test.—The progeny test has as its object the evaluation of a selection in terms of the average utility and of the stability of the self-fertilised derivatives of the selection. Two methods of planning the test are employed by breeders generally. One is the "head-to-row" method in which the seeds from a head of a selected plant are sown out in a single or double row for comparison with other selections sown out in the same fashion. The other is the hundred-plants' test in which a hundred seeds are planted, spaced out at regular intervals for comparison with other similar plots representing other selections. Where yield tests are a consideration, and these may be taken as necessary in every case, the plots of hundred-plants are distributed in the field like the squares of a draught-board and each selection is represented in several of the squares for the purpose of obtaining a true average result, in view of the occurrence of possible differences in the soil conditions throughout the testing area. The average plants on which determinations are made are those within the two or three outer rows of the square. The elimination of the outer rows ensures the neglecting of those plants which by reason of the effects of unequal tillering or unequal shading might falsify comparative results.

The progeny test may refer to a single special characteristic which may be most easily investigated during the growing season and in such a case the line or row system of planting has advantages as more easy access is thereby provided to all the plants. Generally the yield test is the deciding test of value and consequently the hundred-plants' system is most regularly employed. The average values of selections are determined after harvesting by means of such tests as are applicable to the appraisement of the particular characteristic in respect of which selection is made. Tests of quality can frequently be made on the material grown in small plots; fairly reliable tests of baking strength can be made on a small quantity of wheat grain. H. Hunter in his researches on brewing barley in Ireland found a low nitrogen contact of the grain a sufficient guide to the brewing quality of his selections.

Re-selection in Pure Lines.—The pure-line theory excludes all possibility of improving a stable selection by further selection. Johannsen showed that selection within a pure line did not affect permanently the average quality of the pure-line. Other experimenters have obtained similar results which tend to show that the effect of selection in a pure pedigreed strain is not permanent though a certain effect can be maintained if the process of selection is continued generation after generation. Hereditary variation is of course liable to and undoubtedly does occur after a variety is in cultivation, but the chances of its occurrence, either by sudden sporting or by continuous variation in an annual hundred representatives, are relatively small. Consequently the search for spontaneous variations in small field-plots of new selections does not suggest itself as a hopeful mode of gaining an improvement, especially as a very simple method of creating variation in abundance is that of artificially crossing two distinct varieties.

The Value of Uniformity.—The importance of uniformity may have been exaggerated by breeders, inasmuch as a stable extracted strain may be so lacking in plasticity that it does not readily adapt itself to a great variety of conditions and may have a limited optimum of cultural and climatic conditions in which it may thrive.

It is most important, however, that superior strains should be recognisable and identifiable and that at the main source of distribution they should be kept distinct. Even if it be found that two or more strains of the same variety, when mixed, give a better average return over a series of years than either of the strains singly, it is still important that so long as they are multiplied for seed purposes they should be kept pure to their strain if only to prevent commercial substitution of unselected stock for the improved varieties.

There is evidence that some species and some varieties are more stable and uniform than others. Examples of these are Hallett's "Pedigree Chevallier Barley" and Le Couteur's "Bellevue de Talavera Wheat." All attempts to improve the former failed at Svalöf and the latter has been generally recognised as a particularly stable strain of wheat. It is probable that many selections are end products of variation and have lost all power of change. The numerous examples of selected varieties from the Propsteier type of oat and the physiologically distinct varieties of "Square Head Wheat," combined with considerations of the wide adaptability of the two types, may, on the other hand, indicate that these types are still in a state of considerable plasticity.

The opinion is generally held among breeders that the races of barley have practically arrived at a condition of stability while many varieties of oats are essentially in a plastic condition. It is a common occurrence to find hybridists express doubt on the fixity of the parental types of oats which they use for crossing.

Review.—The various theories on variation, supported by the experiences of the breeders, furnish an explanation of the successes of the early selectors, and also the reasons of certain failures.

Shirreff's early successes were due to his appreciation of a useful variety at first sight. The very fact that he was on the look-out for foundlings of special merit and not necessarily for improved strains of standard varieties led him to adopt the principle of the isolation of the pedigree strain, because, having only one plant to start with, he could not do otherwise. When in his later years he, in his fuller experience, recognised the fact of variation in standard varieties, he naturally subjected them to the same principle of cultivation which he had adopted in his early work. The validity of his principles has been adequately endorsed by the experience of a later era.

Hallett's principle of selection was sound in that he developed his strains from single seeds and in this way probably selected fixed types unlike the other individuals of the selective variety. The point on which his principle was unsound was to be found in his theory of improvement by an intensive cultivation which had the effect of hiding the deficiencies of his selection and resulted in the non-success of several of his pedigree strains when they were removed from the conditions of special culture to conditions of ordinary field cultivation.

The principle of mass selection as employed according to the method described by De Vries is open to similar criticism on the score of the artificial results obtained through special cultivation of the élite strains. It is open to a further criticism. Experiment has shown that selections are to be judged according to the mean values of their derivatives and that the fluctuating variations of strains are frequently much greater than the fixed relative divergence of the strains themselves. Thus it is a practical impossibility to exclude from a mass selection all the representatives of weak strains. Mass selection takes account of the special features of a plant without reference to the permanent hereditary average value of these special features in the progeny. A selection *en masse* may thus be expected to contain individuals whose special attractiveness is only temporary and which would in consequence, when multiplied, have a tendency to revert partly to the average of the original race.

Johannsen's analysis verified the experiences of Vilmorin, Nilsson and Hays, and established the method of the progeny test for purposes of evaluating the worth of a selection by reference to its performance in reproduction.

Modern Developments.—The conception of the measurement of variation by reference to *performance* rather than to *form* has brought about a radical change in the methods of selection.

As the theory of Johannsen was evolved contemporaneously with the maturation of the principle of pure-line selection at the Svalöf Institute, and as the work there is distinguished from that in other countries by its continuity, being an institute for breeding only, it was a natural sequence of events that the Institute should about 1901 discard the system of attempting to isolate new types on the basis of intuition and henceforth depend on comparative eliminating tests to indicate the best strains. The performance of a selected strain may be in terms of a single, or apparently single, physiological character, such as productivity, resistance to cold or to disease, stoutness of straw, early maturity, or it may be in terms of the best combination of two or more of these characters.

Since its adoption at the Institute this system has never been departed from: it is used alike for the purpose of testing direct selections and selections following hybridisation.

The progeny test on the basis of performance has been adopted in plant-breeding experiments in other countries and has become the standard method of selection. Its practice has led to the sifting out of all established varieties of cereals in every country with a view to eliminating the degenerate forms they contain and to perpetuating the best strains within varieties.

The importance of inbreeding in establishing uniformity has been realised by the hybridist both for the initial preparation of his parental strains and for the fixing of the products of his crosses. Much attention has been paid by E. M. East (Connecticut) to the question of the exploitation of hybrid vigour for the purpose of obtaining maximum yield in maize; his researches have an important bearing on the breeding of other species. His experience showed that the greatest deterioration takes place in the first year of inbreeding, that in subsequent generations there is gradual decrease in productivity to the point where stability is attained, and that thereafter there is not further decrease. Hybridisation restores the vigour and the productive condition. The importance of this in the breeding of maize is that there can be isolated by inbreeding stable forms which, when crossed, will furnish a known *quality* of produce, while the crossing after isolation will give the desired uniform quality in maximum quantity. As maize carries the male and female flowers at different parts of the plant, the amount of first generation hybrid produce that can be obtained in a season is only limited by the quantity of seed of the inbred parents which is available for sowing, as cross-fertilisation takes place naturally if the seed of the two parent types be sown together.

East is one of the most distinguished of the group of scientific plant-breeders in the United States, the range, importance, volume and genius of whose combined work are quite unexampled in other countries. Their work has a direct theoretical bearing on the practical problems before breeders in this country and is having an immense influence on cultivation in their own.

Modern researches into the nature and expression of segregation have shown the original Mendelian law to be inadequate for the complete explanation of all the phenomena of hybridisation, and so many modifications of the simple expression of the *law* have been found that it is almost necessary to consider each crossing as a new experiment Segregation has been found to be more frequently incomplete than absolute, the first generation form being generally intermediate in character between the parents, while consequent segregation produces a series of forms of all intermediate grades between the parent forms. Transgressive segregation sometimes takes place—*i.e.*, some of the hybrid progeny may exceed the limits of the variation shown by either of the parents. Individual plants closer headed than either parent frequently appear in hybrids of wheat and barley and earlier types than either parent in hybrid oats. This latter fact has obviously an important bearing on the breeding of oats. Nilsson Ehle (Svalöf) states that all the characters of cereals which are of economic importance—*e.g.*, resistance to disease, resistance to cold, resistance to lodging—are transmitted in this intermediate fashion. Any assumption of the stability of a hybrid selection has thus to be a very guarded one.

The expression of these intermediate characters has been the subject of extensive study by East and R. A. Emerson, another distinguished American hybridist, who have made exhaustive analysis of the hereditary transmission of quantitative characters in maize. In view of the fact that the mode of transmission is similar to that of physiological characters in general, this study may have an important relation to practical breeding, particularly if it is developed along with the study of association of characters.

The Study of Correlations.—One of the most important developments in the study of the application of the laws of inheritance to plant-breeding is the study of the reciprocal association between the various characters or the various qualities of a species. The discovery that sometimes two or more form-characters may not become dissociated in hybridisation but may segregate in unison, indicated the probability that physiological and physical qualities are transmitted not individually but in definite groups. This is important to the experimenter if it offers any possibility of affording pointers to the possible commercial importance of a selection at an early stage by reference to easily recognised external botanical characteristics. The attempt to classify associations of characters is really an endeavour to reduce to a formula the means by which an expert dealer assesses the value of produce by the form alone, or to arrive by concentrated or intensive study of individual specimens at the generalisations which are the property of wide experience.

Nilsson (Svalöf) was the first to develop the idea of association of characters in plants in connection with the early application of the principle of single-plant selection. As, however, certain correlations were assumed, little success was obtained by the utilisation of the principle. Even as empirical methods of selection had proved to be at fault, so it was found that experiential assumptions regarding correlations were of little value. The study of correlations has, however, been taken up systematically in America and has developed in the same way as the study of pure lines: it has been applied to the progeny test. By careful computation of average values and of certain characters with their relation to the average values of certain *other characters, it has been shown that definite correlations sometimes do exist in varieties. The collection of data along this particular line would probably be to breeders a useful* guide similar to that provided by a collection of Mendelian data.

The theory that sudden wide sporting is a general phenomenon has been largely discredited and the view of the frequent occurrence of small hereditary variations has been generally accepted. Nilsson Ehle (Svalöf) considers the variations in cultivated types to be segregates from fortuitous crosses which he asserts are not nearly so infrequent as they are supposed to be. So far as variation is concerned, the breeder is mainly interested in its occurrence and in the methods of obtaining variation in combinations; selections from cultivated races have been shown to be sufficiently static to afford him adequate assurance of the continuance of uniformity of selected strains, while the condition of old standard types has been shown to be sufficiently diverse to ensure the provision of abundant material for selection.

Practical Results.—Work on the accepted principles of breeding with these and other corollaries and modifications has produced a plethora of cereal varieties of improved character. Most of the popular varieties now grown in this country have been introduced within the present century.

The firm of Gartons Ltd. has continued with success the development of new varieties of cereals and has within the last two decades been responsible for the distribution of some thirty-five new hybrid varieties of wheat, oats, and barley.

Professor Biffen working with wheat has applied the Mendelian principle to the problems of rust resistance, development of baking strength, yield, and strength of straw, and has bred the notable varieties "Little Joss," "Fenman," and "Yeoman," the last named of which is reputed to hold the official record for yield—viz., 96 bushels per acre.

H. Hunter has developed on the pedigree principle improved strains of "Archer" barley suitable for Ireland by selection on the basis of yield and of low nitrogen content of grain, a basis which has been found adequate for determining malting value. Hunter, A. S. Beaven and Biffen, have all by hybridisation obtained combinations of the stiff-strawed character of the "Archer" type of barley with the finer quality of grain of the close-headed types in the varieties "Archer-Spratt," "Plumage Archer," and "Archplume."

In Scotland plant-breeding of cereals was among the activities of the late Dr J. Wilson at St Andrews University, but his work has not yet found expression in the introduction of any commercial variety. The material collected by Wilson and W. Robb has been transferred to the new Scottish Society for Research in Plant-Breeding at their station at Corstorphine.

It is interesting to note a return to mass-selection methods on the part of a private breeder, Wm. Runcieman of Castleton, Aberdeenshire, who has developed an excellent and uniform type of the "Potato Oat" which has achieved wide popularity in Scotland.

THE IMPROVEMENT OF HERBAGE PLANTS.

The cultivation of forage plants does not seem to have had the same attention as given to cereal and other crops in any period of history noted as a time of agricultural progress.

Hence it can be understood that attention would be given to the improvement of staple crops before attempts were made to obtain improved forms of herbage plants.

The history of the herbage plants in this country is largely a history of "introductions" from Europe and America.

Nevertheless, during the first half of the nineteenth century, when agriculturists in general were striving to improve the staple crops, there were not wanting certain of them who directed their attention to the improvement of some of the commonly cultivated grasses.

Lawson in his 'Vegetable Products of Scotland' mentions Thomas Pollexfen of Kirkwall as the raiser of a strain of ryegrass known as "Orkney" ryegrass.

Lawson also states that "about 1820 an extensive set of experiments with grasses was instituted at Woburn Abbey, the results of which are recorded by Mr George Sinclair in his invaluable 'Hortus Gramineus Woburnensis,' which work may justly be said to have first directed that general attention to the cultivation of useful grasses so long and unaccountably withheld." The results of these experiments established the superiority of certain selected strains—Whitworth's, Russell's, and others—all of which are now forgotten.

Apparently only ryegrass came in for the attention of improvers, and according to Lawson there were in the early part of the nineteenth century a considerable number of strains or reputed strains of ryegrass in addition to "Pacey's" well-known short-seeded strain, which had been developed by its raiser to improve in this species the perennial quality lost by the "repeated saving of ryegrass from first crops."

Incidentally it may be suggested that a similar reason is probably applicable to the lack of permanence of perennial ryegrass at the present time. The plant has developed a biennial condition because seed is rarely saved from any other than a seed crop fifteen months from the time of sowing down.

The breeding of special strains of grasses or clovers is a much bigger and more difficult undertaking than is presented by the cereals.

All the perennial herbage crops are either commonly or necessarily cross-fertilised in nature. It is thus to be assumed that selections will be heterogeneous in composition and that they will not breed true from seed. It may further be assumed that a process of inbreeding to establish uniformity may result in a loss of vigour. Where nature prescribes cross-fertilisation, this form of reproduction is generally essential for the production of a strong and vigorous progeny.

The selector, in starting to improve a species of grass, would naturally select strong and vigorous plants, and the resultant progeny from seed would in all probability be of mixed composition. In reducing this to stability by a process of self-fertilisation, he would probably reduce the selections to a condition much less vigorous and productive than that of their original ancestor.

There are further difficulties which are associated with the development of a technique which will afford the results desired. Herbage plants are ubiquitous. Grasses are wind pollinated. They produce a tremendous quantity of pollen which may be seen sweeping in clouds across a grass field before a light wind when the plants are in full flower. Red clover is dependent absolutely on the bee for fertilisation while white clover is commonly, though not necessarily, cross-pollinated through the same medium.

In the process of establishing a pure and uniform variety of herbage plants, it is thus necessary to guard against cross-fertilisation of the subjects of the experiment. If the original selection is heterogeneous in respect of a number of characters, it will be necessary to repeat the process of self-fertilisation over five or more generations before useful and stable strains are found. Having found them, the experimenter must further guard them from admixture in fertilisation with contiguous plants of the same species until he has sufficient seed to sow out his variety in conditions which will ensure a maximum of stability in the produce resulting from his seeding.

Timothy Improvement in the United States.—The account of Webber of the experiments at Cornell University in the improvement of timothy furnishes an indication of the meticulous methods which must be employed in work of this kind, of the careful precautions which must be taken, of the time and labour spent in multiplication of selections, as well as of the possible improvement which may be expected to result.

A short synopsis of the account is given here as an illustration of the kind of technique which, with modifications, must be employed in work directed to the improvement of herbage species.

In 1903 large numbers of seed samples were collected from different sources in America and other countries in order to provide material for the study of the range of variation of the species. The plants from this seed were raised in sterilised soil under glass and afterwards planted out, each sample being represented by forty-two plants in two rows. The original collection contained 12,516 plants. Plants showing extremes of various characters were selected in 1905 and open-fertilised seed was saved from them. This furnished 4704 plants. In this year a complete study was made of the botanical characters and their variations and association.

Intensive Study.—In 1907 selected plants were self-fertilised by enclosing the heads of each in separate bags to prevent cross-fertilisation. The mother plants from which the self-fertilised seed was obtained were dug up, cuttings being taken in order to multiply them by vegetative propagation. The inbred seed was germinated under glass in sterilised soil and the seedlings transplanted.

Vegetative propagation by means of cuttings was discovered to be an excellent method of obtaining an idea of the intrinsic character of the plant: in 200 plots, each containing the cuttings of an individual plant, the individuality was so pronounced that no two plots were alike.

In 1908 and 1909 examination of the plots derived from the inbred seed showed that in a very large number of plots the seedling plants were true to the type of the parent plants; others were of hybrid origin and produced mixed types. The plots of vegetatively propagated selection gave the larger yield of produce (hay). Plots from open fertilised seed of three selections gave a smaller yield and plots from inbred seed still less. Plots from seed derived by cross-breeding similar types gave no useful results; the hybrid plants did not maintain the type for which they were crossed. Relatively, however, the yields from either self-fertilised or open-fertilised seed of a good selection were in every case greater than those of an inferior one.

Methods of Isolation, Multiplication and Comparison.—Inbred seed known to have special virtue is saved from the vegetatively propagated parent. Varieties breeding true are tested against commercial varieties in plots, and isolated field plots are raised from inbred seed to provide enough stock seed to sow out a field for the procuring of commercial seed. The seventeen best varieties which were isolated yielded in plot tests an average increase over the check plots from commercial seed of 36⅔ per cent.

The selection and purifying of strains of herbage plants has been a feature of the plant-breeding work both at the Svalöf Institute and at the Danish station at Tystofte, and the results of the operations of both stations are now, in the case of some species, so far advanced that the special varieties are already well distributed. The Danish "Olsgaard" strain of cocksfoot, which has been shown by comparative test to be the best strain in Denmark, now provides the bulk of the commercial seed exported.

THE DEVELOPMENT OF THE POTATO.

The potato, as first introduced into Europe, by the Spaniards and into England by Sir Walter Raleigh, was, if one may judge from the earliest illustration of the plant, a wilder plant carrying very much coarser tubers than we find in the refined varieties which we to-day possess.

There are no historical records of the progressive stages of improvement from the semi-wild forms of tuber to the attractive shapes of the modern varieties, and we must assume that the development towards refinement was the work of many persons interested in the cultivation of the plant. The cultivation of the potato was not general in England till the middle of the eighteenth century and later than that in Scotland. By the middle of the nineteenth century there were in Scotland innumerable varieties of the species. The raising of varieties from the true seed derived from the plum appears to have been common among market-gardeners and amateur growers. Doubtless the endeavour of these improvers was to obtain varieties excelling in yield, quality, and refinement. Trade in the produce in a large way had not commenced; it was largely confined to market-gardeners who supplied the market in their immediate vicinity. Varieties were grown to suit local requirements and consequently each locality had its own specially-noted varieties. Very few varieties possessed more than this local reputation. The blight of 1845-6 swept away all the old varieties and for a time practically put the potato out of cultivation. From that date onwards the development of the potato in this country can be traced, and the record of development is largely a record of attempts to find an adequate balance between the power of the plant to resist disease and its capacity to give a remunerative crop.

Among those cultivators who had produced varieties for the purposes of his trade in potatoes and who found his labours ruined by the disastrous disease was William Paterson of Dundee. Undismayed by the effect of the disease, he set to work to build up strong and invigorated varieties capable of resisting its ravages. He collected from foreign sources numerous varieties and planted them together, believing that in this way he could procure cross-fertilisation of varieties through the medium of insect visitation. It is probable that natural cross-fertilisation is at most a rare occurrence in the potato: insects likely to transfer pollen seldom visit the flowers, and, while pollen may readily be carried by a strong breeze, the chances of a cross occurring naturally may be discounted, as varieties which readily produce natural plums do so in virtue of the very obvious facility for self-pollination afforded by the arrangement of the floral parts. It is therefore highly probable that Paterson's introductions were seedlings from self-fertilised flowers. He was very successful in selecting vigorous and disease-resistant seedlings of which the best known was the "Victoria." This variety has been the foundation for the production of many of the varieties at present in fashion. The "Victoria" was introduced about 1850. The latter half of the century succeeding its introduction was an era of trade expansion, the greater extension of the potato as a farm crop both favouring and encouraging interest in the development of varieties suited to a great diversity of agricultural conditions.

Subsequent to Paterson's day the most notable introductions were Nicol's highly blight-resistant "Champion" (about 1867) and Sutton's "Magnum Bonum" (1876). The recurrence of a series of bad seasons from 1877 to 1879 induced renewed attempts to fortify the species against the effects of the blight. The "Maincrop" of which "Langworthy" and "Golden Wonder" are the modern prototypes, was introduced in 1882; Sutton's "Abundance" followed in 1886; and the first of the popular varieties raised by Archibald Findlay appeared about 1887.

During a long lifetime entirely given to the improvement of the potato, Findlay was among raisers the most successful in producing varieties easy of cultivation and reliable in respect of return. The varieties "Up-to-Date" (1893) and "British Queen" (1894), in the zenith of their popularity, must have occupied a very large area of the potato ground in Great Britain.

The firm of Sutton's has also been notable in introducing many popular varieties. "Epicure" has proved to be the most reliable early variety for the special areas on the West Coast devoted to the commercial growing of potatoes for the early market. This potato is an excellent example of the adaptation which may be secured by breeding to suit special circumstances. Deficient in point of quality, the variety is one which can be cultivated in the extremely light sandy soil on the western borders of Lancashire and Ayrshire: it is capable of resisting summer frosts and the effects of the prevalent strong winds on the sandy soil; it bulks very early and so gives a remarkable tonnage per acre at, or shortly after, midsummer. It has thus created a market for itself a fortnight earlier than that for other varieties and has a free run of that market before other varieties are available.

The early part of the century saw a further development by the introduction of the varieties "President"—a Dutch variety introduced by Messrs Sutton & Son in 1901, which was found to be specially suitable for cultivation on heavy soils—and "King Edward VII." (1902), a variety which has become a standard one in Central and Eastern England.

In 1904 "Evergood" was introduced by Findlay and has held a place in English potato cultivation ever since.

Bad years in 1904-5 again aroused interest in obtaining resistant varieties and were the primary cause of the notorious boom in Findlay's new varieties "Eldorado" and "Northern Star." Having reputedly escaped the blight, they became the subjects of a speculative distribution in which as much as £175 was paid for a single tuber of "Eldorado" and a guinea each for cuttings of the same variety.

Potato-breeding was commenced about this time at St Andrews University by Dr J. Wilson. Utilising the wild forms *Solanum maglia*, *Solanum etuberosum* and *Solanum commersonii* for crossing with the common type, he developed a number of varieties notably resistant to blight and immune from Wart Disease, the most attractive of which are only now beginning to come on the market.

About the same time Donald Mackelvie commenced his work in Arran and in 1912 introduced the popular variety "Arran Chief."

The next phase in the development of the potato and in the modern history of this cultivated species is associated with the discovery of the existence of Wart Disease in this country about 1900, and the realisation of the menace to the cultivation of the crop which came with the knowledge of the alarming extent to which it had spread before 1916. The disease is a very insidious one and the danger lies in the fact that when once it is introduced into a field it cannot be eradicated, but will increase in extent with each successive crop of potatoes.

Fortunately it had been brought to the notice of the Board of Agriculture and Fisheries and through that public department to the notice of those engaged in the development of the potato (raisers, merchants and growers), that certain varieties planted in infected land escaped the disease altogether. Among standard varieties "Langworthy," "Golden Wonder," and "Abundance" proved to be immune.

This led to the establishment of the now well-known Wart Disease Testing Station at Ormskirk under the direction of John Snell, where during the past five years several hundreds of varieties, new and old, have been subjected to the test of cultivation in highly-infected land. A similar station has now been established at Philpstoun by the Board of Agriculture for Scotland.

The public departments concerned in the control of the disease have considered it expedient to place a veto (in certain areas where the disease is already prevalent) on the planting of varieties which are liable to be affected by Wart Disease. The result of this official activity has been to cause a revolution in potato-breeding. Since the discovery of the immunity from Wart Disease of certain varieties, and since the publication of the results of the early operations of the Ormskirk Station, it has been found to be a comparatively easy matter to produce new varieties which are immune from the disease. The shortage of food in the later period of the war, influenced to some extent by the comparative failure of the potato crop in 1916, associated with the prominence given to the facts connected with the spread of Wart Disease and with the measures of control taken by the authorities, as well as to the publicity given to the varieties which successfully passed the immunity test, created a tremendous interest in potato-breeding. In Scotland the interest was intensified by the enhanced demand for seed of all varieties and especially of immune varieties for England.

The following is a short list of the more important new immune varieties, with the names of the introducers or raisers :—

Great Scot (A. W. M'Alister).
Kerr's Pink (Raeburn & Co.)
Majestic (Findlay).
Arran Comrade (Mackelvie).
Arran Victory (Mackelvie).
Templar (Wilson).
Lochar (W. T. Farish).
Tinwald Perfection (W. T. Farish).
Rhoderick Dhu (S. T. Farish).
Crusader (Wilson)

A new problem is before the breeders. The new varieties, of which there is a superabundance already, are not acceptable in the sense of being *omnibus* varieties, such as the popular kinds they have partially superseded—" Up-to-Date," " British Queen," " President," " Arran Chief," " King Edward VII." and " Epicure."

The country does not require a great number of kinds but at most a dozen of immune, high-yielding, blight-resistant, marketable varieties.

G. T. Malthouse has shown that derivatives of immune varieties are not necessarily themselves immune, and also that susceptible varieties do not give rise to non-immune types. The present method used by plant-breeders is a rough-and-ready one. There are one or two immune varieties which readily produce a profusion of pollen and these are being utilised to raise crossed plums on other varieties. Seedlings procured from the sowing of the seed thus produced are selected and tested to determine their resistance to Wart Disease and to Blight, their yielding capacity and quality being also primary considerations in selection.

In the light of our present knowledge regarding the hereditary potentialities of the species and the behaviour of characters in variety hybrids, it is the only practical method. Salaman[1] has investigated the Mendelian values of certain characters of the potato and published certain data which are useful guiding principles in the selection of material for hybridisation, but as yet we know little about the heredity of disease-resistance in the species. The actual process of breeding new varieties of the potato presents no special difficulties. In breeding to obtain commercial varieties, it is simply a matter of collecting pollen and placing it on the stigma of the flower of the variety it is desirable to cross, first of all removing the stamens of the latter at an early stage if the variety is normally a plum-former. In the case of crosses performed for the purpose of obtaining accurate scientific information, elaborate precautions are necessary to prevent chance pollen from any other source than the chosen pollen coming in contact with the flower of the seed-parent. The whole secret of obtaining hybrid seed from varieties which do not readily form plums is to use pollen from a variety which has " strong " pollen, and to pollinate the same stigma several days in succession. If this rule be followed, practically every operation will be effective.

Neither does the selection present special difficulties beyond those associated with the trouble of dealing with hundreds or even thousands of varieties. A season's pollinations may readily produce several thousand seeds; but an acre will only suffice to plant approximately 20,000 seedling plants. Generally speaking, 90 per cent of seedlings can be discarded at sight. The immunity test offers a further standard for discarding. Unfortunately, the hereditary values of the immunity of varieties, either when self-pollinated or in combination with other varieties, are unknown. If they were, it might be possible beforehand to judge the approximate number of immune varieties one might expect from crosses between individuals of a large number of common varieties, and the breeder could then measure the amount of work he should set himself according to the facilities at his disposal. In view of the increased attention being paid to the breeding of the potato, information on this point may be expected in the near future.

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[1] R. Salaman, "On the Hereditary Characters in the Potato,' 'Journ Roy. Hort. Soc.,' 1912.

ROOTS.

The turnip was known to the ancient Greeks and the Romans may have obtained it from the East. It probably came to Britain with the Roman armies and indeed spread over the Continent in this way.

In the Low Countries it was an important crop in the fifteenth century. Although commonly cultivated in monastery gardens from an early period, the first known record of the use of the turnip is in 1586. It was first introduced into field cultivation in 1730 by Lord Townshend.

The swede was introduced in 1781-82. Turnips were first grown in Norfolk and were later introduced into Scotland. Yellow turnips were well known in Scotland at the beginning of the eighteenth century and by the middle of the century the Scottish agriculturists were famed for the excellence of their varieties.

The principal cause of the unquestioned superiority of the Scottish turnips was attributed by writers of the time to the care taken in the production of the seed and to the exertions of Border farmers in Northumberland, Cumberland, Berwick and Roxburgh, who about 1750 introduced the practice of drilling.

Lawson mentions the names of several agriculturists who were famed for their stocks and it would appear that Scottish farmers maintained their own stocks as a matter of ordinary practice. While the early improvement of the field turnip and swede was the work of the individual agriculturist, the further development has largely been left, probably in the first instance, to the seedsmen-farmers and latterly to these and to the professional producers of seeds in large firms which make this a part of their commercial business. As a consequence little is known of the methods of improvement. Probably the only breeder, professionally a scientist, who devoted much attention to the turnip was Dr J. Wilson of St Andrews University.

There is little or no authentic record of the origin of the many excellent varieties, some of which are, at least in name, the descendants of stocks that have been in the country for the best part of a century.

The methods of maintaining the excellence of good stocks are probably the same as those practised by the early selectors and seed-raisers. Turnips are insect-fertilised and, unless great care is taken, there is a danger of cross-fertilisation, not only with other varieties, but with other types of plants developed from the same species stock, such as rape. The customary method of maintaining stocks consists of a mass selection of attractive bulbs typical of the variety which it is intended to perpetuate. No artificial means of judging the bulbs are employed except by some of the professional seed-producing firms; judgment of the best bulbs is commonly made by the eye alone. The bulbs are flowered and seeded in a place isolated from other flowering roots. The seed obtained forms the stock seed from which the commercial seed is raised in an area suitable for seed production. This condition of affairs is customary in the turnip-growing areas. The agriculturists, with a few exceptions, depend on the seedsmen to supply seed specially developed for the purposes of a particular area.

The most noteworthy work in the improvement of the root-crops of recent years is therefore not the development of a scientific system of breeding, but the introduction of a system of competitive trials of stocks for the purpose of eliminating unworthy kinds from the market. This method of improvement has been developed to a high degree of perfection in Denmark, where, at first under the ægis of the Danish "Society for Improving Cultivated Plants," and since 1897 managed by a State Committee, it has been in operation since 1889. The idea originated with L. Helweg who was from 1886 the Superintendent of the Society's trials and since 1897 the Danish Government's Root Commissioner. Helweg's investigations showed that the right basis on which to estimate the value of a particular strain was that of the yield of solids per acre and not the total yield of roots. They also showed that although the yield of solids varied with the different soils in which the roots were grown, yet the relative merit of any strain was the same in whatever conditions it was grown. From 1889 to 1899 the work was experimental and largely directed to discovering a reliable technique for estimating values with exactitude. From 1899 the actual work was carried on at the State Experimental Stations where the cultivation of the competing strains are under the personal supervision and are subject to the unbiassed judgment of the respective directors. The seed of the competitive strains is received by invitation and subjected to competitive test at five stations at least for four years. After the first two years the inferior strains are discarded and the good strains submitted to further test. For this purpose the competitors are called on to supply two samples—one from the trade seed developed from the original stock seed submitted, and another from the new stock seed. The value of each strain is estimated by reference to the yield of dry matter as found by analysis at each station, and the relative excellence of each is determined by the average of the results at the various stations. The results are publicly announced. The identity of the commercial seed of the approved strains is verified: the seed is distributed in officially-sealed bags, elaborate precaution being taken to obviate substitution and to ensure to each purchaser authentic seed of the approved strain.[1]

ORGANISATION AND PLANT-BREEDING.

It is an open question whether progress in the improvement of vegetable products depends most on the actual raising of valuable varieties or on an organisation for the exploitation of these when found.

A useful novelty with distinctiveness will find its place in course of time: but a useful novelty which is just a little better than the accepted standard will not succeed without advertisement.

It is certain that very notable progress can be made by a system of organisation alone, but the ideal system of making the best of a nation's efforts in the direction of betterment is a combination of science with reliable advertisement associated with an efficient organisation for distribution.

Various methods are employed in different countries but they all depend on the operations of an independent or reliable authority to ensure, firstly, that varieties are improvements, and secondly, to ensure that the buyer gets the right article.

The Danish system outlined above depends less on the development of products directly by the organisation than on the endorsement of the best varieties which are in the country by a scheme for the independent comparative valuation of varieties on the result of competitive tests.

In contrast, the Swedish Seed Association[2] which controls the working of the station at Svalöf lays special importance on the actual production of improved varieties, and having the whole stocks of these under control until ready for distribution, the Association can probably ensure greater authenticity and purity of stock than can be obtained by the operation of the Danish system.

The Association receives from the station the varieties which have been developed there, tests them, ensures their maintenance in a state of purity until they are in great enough quantity to be ready for distribution, and finally markets them.

An excellent example of a voluntary organisation for the maintenance and improvement of stocks is the Canadian Seed Growers' Association which was founded in 1904 for the purpose of maintaining pure and productive stocks of useful varieties of agricultural plants, and of giving prominence to the work of those agriculturists who made the growing and careful handling of seed a special branch of their farming operations. The Association affords its members the opportunity of having their special stocks of seed registered after being inspected and recommended by experts who are authorised by the Association. The Association registers hand-selected stock seed and the product of such seed up to the third generation from the date of the original selection, subject to recommendation by one of its inspecting officers that the seed has been grown and handled in accordance with the rules of the Association. The Association further places its seal on all seed thus registered and has an arrangement by which it has a record kept of all registered seed distributed.

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[1] Harold Faber, 'Forage Crops in Denmark.'

[2] The attention of British agriculturists was first directed to the methods and organisation of the Svalof Institute by Sir R. B. Greig in the 'Journal of the Board of Agriculture and Fisheries,' August 1910—"Improvement of Crops by Selection."

The main lines of development of the organisation of scientific work for the future improvement of cultivated plants in Scotland have been based by those interested in this development on the best features of the three types of organisation which have been barely outlined above. The adoption by Scottish agriculturists and seedsmen of schemes of development has been due largely to the initiative of the Highland and Agricultural Society, stimulated by the energy and enthusiasm of Mr James Elder, and to the Board of Agriculture for Scotland whose Commissioner, Sir Robert B. Greig, has been largely responsible for the formulation of the guiding principles.

The complete organisation, when in full operation, will include an independent Plant-Breeding Station managed by the Scottish Society for Research in Plant-Breeding which will carry out researches with a view to developing improved varieties of agricultural plants and will multiply and distribute these improved varieties; an official Registration and Seed-Testing Station which will classify and evaluate new varieties, of whatever origin, by comparison with standard varieties and will provide both seedsmen and farmers with an opportunity of testing all kinds of agricultural seeds; a subsidiary station for testing varieties of potatoes for immunity to Wart Disease; while the general organisation of the Board of Agriculture will undertake the certification of pure stocks of seed produce approved by the Registration Station. Part of the scheme is already in operation, and when the work becomes thoroughly established, Scotland should be in a position of self-dependence in the originating of stocks of plants most suitable for her agriculture.

SOME PROBLEMS OF THE MILK INDUSTRY.

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INTRODUCTORY.

THE following pages have been written in response to a request from the Editorial Committee, that the writer should discuss in the pages of these 'Transactions' some of the more important problems of the Milk Industry as carried on at the present date. Throughout the whole of what follows the views expressed are to be taken as those of the writer alone, except where it is otherwise expressly stated or quoted.

The present time is very opportune for making a somewhat comprehensive review of this kind, and this for various reasons. During the past three or four years, and right up to the present moment, a considerable number of Departmental and other Committees have been sitting in both England and Scotland with a view to suggesting to the authorities concerned the best means of dealing with urgent problems of the moment, and also with the object of gathering a mass of evidence upon which recommendations were to be, and have been, made for guidance in the future. The most important of these Committees was the Committee on the Production and Distribution of Milk, which has come to be known as the "Astor" Committee, its chairman being Viscount Astor. That Committee sat in London for nearly three years, beginning in April 1917. It issued three Interim Reports, and its Final Report, which is a document of eighty-nine pages, is one of the most valuable contributions to the modern literature of the Milk Industry which has appeared. It summarises the enormous mass of evidence which was brought before the Committee, and which deals with almost every aspect of the industry, and upon this evidence the Report makes a number of recommendations for improvements in many directions. It should be read by every producer and distributor of milk; and if the mass of consumers could also be induced to master its contents, a great step would be taken in the education of public opinion on the very important matters involved.

Amongst the recommendations of the Astor Committee was one which was the result of evidence laid before the

Committee with reference to the existing Regulations regarding the sale of milk. Some very serious anomalies had been pointed out, and the Committee, having drawn the attention of Government Departments to these, recommended in their Final Report that the subject should receive immediate attention. As the direct result of that recommendation, the Secretary for Scotland in 1919 appointed an Inter-Departmental Committee for Scotland to consider the whole question of the present laws and regulations under which milk is sold to the public. That Committee has been sitting for about nine months, and its report will be issued shortly. It has taken a mass of invaluable evidence, and collected a number of facts of the very greatest importance in connection with the administration of the law.

There have been other Committees in connection with the Departments of the Ministry of Food and the Ministry of Health which have also dealt with certain aspects of the milk problem, some of whose reports were for the information of the Cabinet and the Ministries concerned. It so happens that the present writer has served on most of the foregoing Committees.

Arising out of all this inquiry into questions of the milk supply, the Ministry of Health and the Scottish Board of Health desired to make use of some of this information to improve their respective Milk and Dairies Acts, the operation of which had been suspended owing to the war, prior to these Acts coming into force. Amending Bills were therefore drafted, one applicable to the English, and the other to the Scottish, Act. Neither of these, however, has yet received the sanction of the Houses of Parliament. The present position is that the original English and Scottish Acts remain upon the Statute Book, but have not yet been put into force. Probably the main reason for this is the very urgent necessity for economy in every sphere of administration; and the institution of the new Acts would, of course, involve a certain amount of new expense in connection with local authorities, who would have to administer them, and for that the moment is not opportune.

For all these reasons, however, the moment does seem very opportune for taking stock of the present position, for giving very careful consideration to some of the matters which have been receiving so much attention in the last two or three years, and for contributing to the best of one's ability some personal ideas on the various points at issue. We are passing through a sort of waiting period, after which, it can hardly be doubted, new legislation will be introduced which every one hopes will place the milk industry on a more satisfactory footing for producers, distributors, and consumers alike. That there is urgent need of reform throughout the trade it is impossible to deny. In some respects we are lamentably behind many other countries in our methods of production and distribution; but the present writer is convinced that, in the light of all the evidence which has been gathered in recent years, the Public Health Departments of this country have now an opportunity, as soon as the financial and industrial condition of the country makes it possible, to reorganise the administration of the Milk Industry on such a footing as will make it a model instead of a reproach. Particularly, perhaps, is this the case in Scotland, in which some of the great difficulties experienced south of the Border are not so overwhelming. For example, we have not to consider in Scotland the problem of the milk supply for a congested area of seven or eight millions of people, such as is found in London, and which forms a problem peculiarly its own. Neither have we at present to contemplate the operations of a great milk combine which controls the milk supply of something like 80 per cent of such a population. We have sufficient problems of our own, but relatively they are simpler, and only require intelligence, common-sense, and the goodwill of all concerned to produce a satisfactory solution. Obviously now is the time to take stock of the position, and that is the primary object of these pages.

Milk as a Necessary Food.

Why all this fuss and trouble about milk production and distribution in this and other countries? The answer to this question, as every one will tell you, is that milk is one of the very few articles of diet which is an absolute necessity to the community in any country. Now, while that statement is true, it is only true in a very much more restricted sense than many people seem to realise. One would think, to hear and read what is sometimes said, that an adequate supply of pure milk of good quality was an absolute necessity for the health of the community at large. Such an idea is entirely false. It is nothing of the sort. Before we can form any correct ideas as to legislation dealing with the Milk Industry, the conditions under which the trade is carried on, and such-like questions, it is, first of all, very important to realise accurately the position of milk in the list of foodstuffs. By the term milk in this and in all other connections in these pages cow's milk is referred to, unless it is otherwise expressly stated. Is, then, milk a necessity at all for the human population? If so, for whom is it a necessity, and to what extent, and of what nutritive quality?

The natural food of any young mammalian animal is the milk of its own mother. The best substitute for that is the milk of another mother of the same species of animal. The natural food of a human infant, therefore, is its own mother's milk, failing which the best substitute is the milk of some other human mother. Unfortunately, the supply of human mother's milk for human infants falls very much below the demand for it, and this principally for two reasons. In the first place, under the conditions of modern civilisation, there are a good many human mothers who cannot feed their own infants on their own milk. We need not go into the medical reasons for this ; it is simply a fact. Still more unfortunately, from the point of view of the welfare of the infant population, there is an even greater number of human mothers who will not nurse their own infants, even if they can. That melancholy fact, too, is the result of modern sociological conditions, into which we need not enter in detail. It is simply another fact. The practical result of these two unfortunate circumstances is that at any given moment there are in the country thousands of human infants for whom the only natural food —namely, their own mothers' milk—is unavailable. For them, therefore, it is an absolute necessity to find an efficient substitute. There is no natural substitute for human milk which gives all its constituents in the same proportions. In other words, the milk of any mammal is primarily adapted by nature to meet the nutritive necessities of the offspring of that particular species. Any mammalian milk used to nourish the young of a mammal of another species loses some of its efficiency for that purpose. It is still less well adapted to meet the adult requirements of another species. Nevertheless, as we have shown above, it is incumbent upon us to find some substitute for the milk of human mothers ; and, in this country at least, the only other mammalian milk which is at all suitable, and which is available in anything like sufficient quantity, is cow's milk. In many other countries of the world which are faced with a similar necessity the milk of goats is very extensively used for this purpose. For the moment, however, we may neglect this source of supply, for the number of goats in this country available for this purpose is almost negligible.

The chemical and biological constituents of the milk of any mammal are closely adapted to all the needs of the young growing offspring of that species. They are not exactly adapted for the young of any other species. Nevertheless, it is fortunately the case that cow's milk does contain the various elements required for early nutrition. It is not so closely adapted to the need of the human infant as human milk itself, but it is by far the best substitute which can be found. The proportion of some of its constituents varies considerably from the proportion of those same constituents in human milk, but these differences can be largely rectified so as to make cow's milk suitable for infant food. For example, the cow's milk may be diluted with water to a given percentage of fat, sugar may be added to a given percentage of sugar, and so on. This sort of alteration can be made from time to time as the infant gets older, and in this manner it is possible to give a very satisfactory substitute for human milk to growing infants of different ages. The knowledge of how this should be done and when it should be done is now very general, thanks to the splendid work performed by child-welfare centres, and agencies of that kind. A medical man responsible for this work in one of our large cities recently told the writer that he believed the great majority of the mothers in the very poorest localities now knew exactly how to treat cow's milk for the needs of their children. When it is properly treated, milk from the cow is by far the best substitute that can be got; in fact, it would be extremely difficult to rear healthy children, or to rear infants at all successfully, on any other food. To the young human infant, therefore, deprived of its own mother's milk, it is an absolute necessity.

The case is very different, however, when we consider adults. For them milk has no special and peculiar advantage as a food. It is merely one of the many foodstuffs from which they may choose in order to supply themselves with material which will give body energy. The chief constituent which is of value for energising is fat, and therefore the percentage of butter fat present in milk is a convenient and proper standard from which to judge that milk as an adult food. In the case of the very young infant, body energy is not the important thing; growth is the vital necessity. It is the protein element in milk, together with the salts, which is essential here, and therefore the fat constituent of milk in the case of infant feeding is relatively of little importance. But the adult can get fat from a great number of sources other than milk, and, indeed, he only takes milk as a matter of personal choice and taste, not from necessity. Many adults, of course, take none at all. For all these reasons it can be understood that it would be the duty of the State, if the supply of milk became greatly reduced, to see that what there was available was given to infants only; and it will be recollected that at one period during the war the State did go the length of restricting the sale of milk in restaurants, and such-like places, in order that the infant population might be supplied.

There is, however, one other section of the community for whom milk is a necessity—namely, invalids, convalescents, and those suffering from certain diseases, who cannot digest any other life-sustaining food. Milk has a great value in such cases in repairing body tissues which may have become wasted, and for this purpose nothing can take its place.

We therefore arrive at the clear conclusion that for infants and invalids cow's milk is an absolute necessity, that it is very valuable for all children, but that in the case of adults it is merely one of many foods available. Being an absolute necessity, it is the duty of the State or municipality, or other local authority, to see that the infant population has available for it a sufficient supply of milk of the quality required. As far as adults are concerned, the duty of the State would appear to be to see that the public get what they pay for in a clean and pure condition, and at a reasonable price.

THE LEGAL ASPECT OF THE SALE OF MILK.

To those who have a right solution of modern milk problems very much at heart, there is no problem of greater importance than that of the laws and regulations which should govern the production and distribution of milk. The present time is a most opportune one for full consideration of these, because owing to the national economic situation any alterations of this kind in the law which might involve any additional cost are rightly suspended. That state of affairs, however, it is to be hoped, will ere long pass away, and questions of public health reform in this and other matters will assume their normal relationship to other questions. When that time comes, it is quite obvious that reform of the milk laws will be one of the first things considered; and, indeed, whatever changes may take place during the next generation, will doubtless be chiefly based upon the inquiries which have been conducted by various Government and other Committees during the immediate past few years. These inquiries are not yet concluded by any means. As a result of serving on many of these Committees, the present writer has formed some very strong impressions regarding present and future legislation, some of which may be mentioned now, it being distinctly understood that the opinions expressed on this subject are purely personal and individual.

The law which especially affects the Milk Industry to-day is Section 4 (1) of the Sale of Food and Drugs Act, 1899, which provides that the Board of Agriculture may, after inquiry, make regulations for determining what deficiency in any of the normal constituents of genuine milk, or what addition of extraneous matter, or proportion of water in any sample of milk shall raise a presumption, until the contrary is proved, that the milk is not genuine, or is injurious to health. Under the powers of this section, the Board of

Agriculture issued, on 5th August 1901, the Sale of Milk Regulations. These declared that where (sweet) milk contained (1) less than 3 per cent of milk fat, or (2) less than 8·5 per cent milk solids other than milk fat, it should be presumed for the purposes of the Sale of Food and Drugs Act, *until the contrary was proved*, that the milk was not genuine by reason of (1) the abstraction of milk fat, or (2) the abstraction of milk solids other than fat, or (3) the addition of water. These regulations of the Board of Agriculture constitute what is commonly known as "the presumptive standard."

Most legal proceedings under these Regulations are taken under Section 6 of the Sale of Food and Drugs Act, 1875, which provides that "no person shall sell to the prejudice "of the purchaser any article of food or any drug which is "not of the nature, substance, and quality of the article "demanded."

Section 25 of the Sale of Food and Drugs Act, 1875, makes provision for the sale of milk under a warranty. Other sections of the same Act provide for the methods of sampling and making analyses. In cases of prosecution, the court of trial and the incidence of expenses were laid down by Section 33 of the Act, and subsequently modified by the Burgh Police (Scotland) Act, 1892, which allowed cases to be tried by the magistrates instead of in the Sheriff Court. The Sale of Food and Drugs Acts made no provision for awarding expenses, this matter being governed by the Summary Jurisdiction (Scotland) Act, 1908, which prevents expenses being awarded in the case of a person prosecuting in the public interest. In this matter the law in England is different.

The Regulations under which milk is sold at present, issued by the Board of Agriculture in 1901 and in 1912, have reference, however, only to the chemical composition of the milk, and take no note whatever of the hygienic condition of the milk as regards cleanliness or purity. These latter qualities, however, have been provided for to a certain extent in the Dairies, Cowsheds, and Milkshops Orders issued by the Privy Council; and Section 4 of the Infectious Diseases (Prevention) Act, 1890, and the Diseases of Animals Act also give additional powers. But in spite of all the various provisions contained in these various legal enactments, the condition of the milk supply has continued to be very unsatisfactory; and it was with a view to improving matters, especially in the direction of hygiene, that the Milk and Dairies (Scotland) Act was passed in 1914. This Act, however, together with the English Act of a similar kind, was suspended until after the termination of the war, and has not been put into operation up till the present. Moreover, since 1914 further experience has shown the desirability of amending that Act, and it was announced in the House of Commons that amending Bills would be introduced before the Acts were put into operation. These have not yet been brought forward. Such is the legal position of the Milk Industry at the moment. Even with all these provisions, there would seem to be room for great improvement in certain directions; and the Astor Committee, which gave some attention to the laws governing the present state of the milk supply, came to the conclusion (paragraph 49, Final Report) that "the existing regulations with regard to the chemical composition of milk require revision." They drew the attention of the Government Departments concerned to anomalies in the present regulations, and urged that the subject should receive immediate attention. The Inter-Departmental Committee, which is now sitting in Scotland, is working upon the lines suggested.

The personal opinion of the present writer is that the whole legal position with regard to milk is profoundly unsatisfactory, and requires drastic alteration from top to bottom. It has been built up bit by bit, one thing being grafted upon another from time to time, with a result that the whole structure has no sound principle or plan running throughout, and it therefore exhibits inconsistencies and confusion. It has led to decisions in the Law Courts in test cases which make good administration impossible. The main objections to the present position are, in our opinion, briefly as follows.

The existing milk legislation has failed to secure the object presumably aimed at—namely, to secure a supply of genuine and pure milk, to protect the consumer from fraud, to punish those guilty of adulteration, and, finally, to protect the honest trader. Dr Savage, who is a great authority on this question, is of opinion that the milk supply to-day is nearly, if not quite, as infected with tubercle bacilli as it was twenty years ago. He thinks that milk may be a little less dirty, but that even in this direction the improvement is trifling. If the addition of preservatives has practically been eliminated, adulteration and the abstraction of cream is still too common, and fraud is merely changing its character and becoming more scientific. He sums up the position in the statement that "our available leading enactments conspicuously fail to provide the consumer with pure milk." The present writer entirely agrees with this conclusion.

But if the law has failed, it becomes of great importance to ascertain the reason, and it is on this question particularly that the writer holds strong personal views. In his view the present law is wrong fundamentally—wrong in the spirit in which it was conceived, and wrong in the manner in which it has been administered. It breathes the spirit of the detection of crime and fraud, followed by punishment, and the inevitable result of that has been that the local administration has developed an atmosphere of suspicion and prosecution. It seems to us that in a matter of public health such a position is fatal. One desires to speak quite plainly on this point. It would appear that the sole object of milk sampling has been the prosecution of those found selling milk below the presumptive standard. It should be distinctly observed that this is not in any way the fault of those officials who have to administer the law. They have to take it as they find it. But such a conception is surely radically wrong. It is hopeless to expect progress and improvement along such lines. Rather, the discovery of an inferior sample of milk which is going for human food ought to be the beginning of a biological inquiry rather than of a legal prosecution. The object of sampling should be, in the first place, to discover the existence of such inferior milk; and, in the second place, to ascertain its origin, with a view to showing those concerned how it can be avoided. That is the spirit in which a public health law should be administered. The idea that a poor sample of milk should be regarded as presumptive evidence of fraud is objectionable. There should be no presumption of anything in such a case. It is simply the discovery of a fact which requires proper investigation to prevent its recurrence. Every one knows that a certain small proportion of perfectly genuine milk will fall below the present, or almost any other, standard. Obviously there should be some legal means of dealing with such milk, without presuming that the producer or the vendor is guilty of a fraud upon the public. It is a natural product, the existence of which has to be recognised. The present law has entirely failed to do this.

In spite of the penalties provided under the present law, adulteration is far too common. Unfortunately, milk is a food which lends itself too readily to adulteration with water, and water is cheap. The result is that the profits which may be derived from this crime are very great, and constitute a real temptation to a certain limited class of trader. It is a particularly mean crime, because it is stealing the essential food of young children. No punishment can be too severe for repeated offences of this sort. Nevertheless, the present law has quite failed to stop the practice, as is obvious to every one who reads the daily newspapers. One would go so far as to say that the present legal methods constitute almost an invitation to fraud. They offer a means of making very large profits with comparatively small risk of detection, and the punishments inflicted are obviously quite futile. It is no uncommon thing to find the same person being fined for the third, fourth, and even fifth offence, and such a trader is still allowed to carry on his business at the expense of the public. Drastic revision is needed here, and every honest man in the trade would most certainly be only too glad if the law provided a means of excluding such persons from taking any part in the industry.

The principal objections to the present law, therefore, are :—

(1) It fails to protect the consumer.
(2) It encourages fraudulent dealing on account of inadequate punishment.
(3) It fails to make provision for those exceptional cases in which genuine milk falls below the standard.
(4) It offers no inducement to the milk producer to provide milk of high chemical and hygienic quality.

In this view, the remedy required is a drastic one. It is no less than the entire reorganisation of the whole system of milk administration from top to bottom. By far the simplest means of securing this would be the placing of everything connected with milk administration under one legal Act, which might be called the Milk Act. It is not reasonable to expect that the provisions of the Sale of Food and Drugs Act, which necessarily must be made to apply to an enormous variety of articles, can cover all the conditions under which a varying natural product such as milk is produced and sold. Our knowledge of milk problems to-day is very much greater than it has ever been, and is sufficient to find legal expression in one comprehensive Act which would cover the whole subject, and which would apply to nothing but milk. The present Milk and Dairies Acts, which are on the Statute Book, would form an excellent basis, but to them might be added all the necessary provisions required to deal with the situations mentioned above. Probably the most important is the abolition of the presumptive standard as a basis for prosecution. In its place there should be a legal minimum standard for the sale of fresh sweet milk as such, and this standard should specify the percentage of fat required and the percentage of non-fatty solids required. The information available as to the average quality of the milk supply in the country is sufficiently ample to enable such a standard to be fixed as could be almost universally attained. Added to this, there should be provision for the sale of a higher quality of milk, in order to encourage dairy farmers and producers.. At present there is no inducement to produce good milk in the first place, or to sell it as such in the second—apart from the conscience of an honest man. Unfortunately, human nature being what it is, this is not sufficient as a commercial proposition. The only method by which the public obtain any article of high quality is to make it financially worth while for some one to produce it and sell it. This is as true of milk as it is of motor-cars, or anything else. The ideal Milk Act which one has in mind would also make provision for dealing with all genuine milk of an abnormal or exceptional character falling below the legal minimum standard of chemical composition. There is no real difficulty about this. The small quantity of such milk which is produced could quite readily be bulked with other milk of higher chemical composition, the total mixture being quite satisfactory. This is, of course, done on a large scale in depots to-day. In addition, there are many outlets for the sale of milk of such low chemical quality in various manufactures.

Lastly, in this connection, is the question of sampling, and this, undoubtedly, is of paramount importance. At the present time there is very wide divergence in the methods adopted by sampling officers, and in the action taken as the result of analyses. There are some districts and areas in which, as the result of many years of conscientious and hard work, the sampling official has attained a fairly satisfactory administration. But there are far more areas of which this could not be said. Under present conditions too much depends upon the personality of the official. One would like to see the whole system of sampling conducted from a different standpoint to that which exists at present, and with a different object in view. Milk sampling, in this view, should be conducted chiefly at the source of production of milk rather than at the consumer's end. Its main object should be to ascertain, for the benefit of the public health administration, what is the nature and quality of the milk which is actually being produced at the time. Given this information, together with the knowledge of how the milk is treated and handled on its journey to the consumer, it would be quite simple to know what the composition and quality of the milk should be which is placed upon any given market. It is merely a question of organising a simple system of registration of wholesalers, distributors, and retailers, all of whom would know the average quality of the milk they were receiving. Sampling at the consumer's end should, of course, also take place; but it is not too much to say that on the lines here advocated it would be far less necessary than it is to-day. Moreover, the officials concerned would find it very much easier to ascertain where any marked change in the milk took place, if such were found to exist. The results of such periodic sampling should be made known to those concerned, whether producer, retailer, or any one else. The analyses of samples might very well be displayed as a routine procedure on retailers' premises for the information of the public. If this were done as a regular practice, it would have an excellent educative effect upon the public mind. Customers would, within a very few months, come to know and understand the significance of a simple analytical statement that a given sample taken on a given date contained a given percentage of fat and non-fatty solids. The retailer himself, if an honest man, would find this an excellent advertisement for his business.

If a legal minimum standard of composition were to be laid down, it should, in the opinion of the writer, specify the percentages required both for fat and non-fatty solids. In various countries of the world, where the legislature has had to face precisely the same difficulties in the Milk Industry as are applicable in this country, such standards have been fixed at different figures. Canada, Australia, and Switzerland, for example, have all instituted a legal minimum standard. The Australian Commonwealth has a general figure for the entire country; but the various States within it are also empowered to fix their own standards, which several of them have done. The following table shows the position in these places, the figures given all referring to percentages of composition :—

Country	Total solids	Fat	Non-fatty solids.
Canada	..	3·25	8·5
Australia		3	8·5
Victoria	12	3·5	8·5
Tasmania	12	3·5	8·5
W. Australia	11·7	3·2	8·5
New Zealand	..	3·25	8·5
Switzerland	12	3	8·5

It will be observed that in all these places the lowest standard fixed as a legal minimum is that of 3 per cent butter fat and 8·5 per cent non-fatty solids. This is well below the average composition of milk in this country; and if such a standard were fixed here, there ought to be no difficulty in maintaining it.

CLEAN MILK PRODUCTION.

Reference has been made to the issue by the Ministry of Food of special licences for milk produced under good hygienic conditions, coupled with freedom from tuberculosis. A word or two may be added here with reference to clean milk production, apart from the question of tuberculosis. In our experience, there is a very great lack of attention to ordinary decent methods of cleanliness at a great many dairy farms, which results in quite unnecessary bacterial contamination of the milk, rendering pasteurisation essential, or else resulting in the souring of much milk. There is no question of great expense or outlay involved here. It is simply a matter of ignorance, prejudice, obstinacy, or bad management. For much of the contamination which occurs there is absolutely no excuse at all. Too often the cows themselves are kept in a filthy dirty condition, and seldom or never groomed. Insufficient attention is paid to washing the udder and clipping long hairs. The cowsheds all too often harbour great numbers of cobwebs, with consequent dust. The milkers themselves are frequently anything but models of cleanly persons—a point to which great attention should be paid. Much of the bacterial contamination of milk is due to the persistent use of the open milk-pail, which exposes the whole surface of the milk to the surrounding air. The universal adoption of the small top milking-pail would make a wonderful difference in the bacterial content of the milk at the consumer's end. Directly the milk is produced, that of each cow should be removed from the byre immediately in the pail into which it was milked. It should then be cooled and strained. All milk should be cooled down to a temperature of about 45° F., or as near that as possible. This immediately inhibits the growth and multiplication of many bacteria, and keeps the milk sweet. In fact, if all milk were cleanly produced on these lines and cooled immediately on production, and kept cool during transit, there would be no need whatever for general pasteurisation as at present carried out, and the consumer would get a perfectly satisfactory, clean, fresh milk.

GRADING OF MILK.

The subject of the grading of milk is very much in the air at present, and as it is possible that the next few years may see important developments in this connection, it is proposed to pay some little attention to the subject in these pages. Stated in its simplest form, the question involved is whether milk should be sold, as at present, at a flat rate of so much a quart or gallon or other measure, quite irrespective of its quality as a food, or its cleanliness, or its freedom from disease; or whether, on the other hand, it should be divided into grades representing differences in the commercial value, or the hygienic qualities, or the food value of the article sold. If the latter proposition be agreed to, the further question then arises as to how milk should be graded, and on what principles, and what exactly the grades should be. These various alternatives demand very careful consideration and thought. A number of different factors in the problem have to be considered and balanced before a just, scientific, and practical answer can be given. It is not sufficient merely to establish a theoretically sound argument. The milk trade constitutes one of the greatest industries in the country. It concerns every single household, which is in touch with it once or twice every day of the year. It is one of the few trades or industries which is of vital importance to the public health and the national welfare. It therefore follows that it is an industry which should be carried out not merely on sound commercial lines, but also in such a manner as will best conduce to the health and nutrition of the community. In a word, it should be organised and supervised with the most extreme care. Unfortunately, that is very far from being the case to-day.

Under ideal conditions, one might say that there should be only one grade of milk sold—namely, a grade of milk which could be guaranteed free from tuberculosis and other infection, cleanly produced and distributed, and of a high nutritive food value. This is the idea of those from whose lips is frequently heard the opinion that they do not believe in grading of milk, because the only grade of milk that should be sold is the best milk. Unfortunately, as has been said, this is not a practical proposition ; it is merely an ideal. Further, it is an ideal which at the present moment is very far from being capable of translation into practical operation. Presumably what is meant by the "best milk" is milk of high butter-fat content, free from tuberculous and other infection, and produced under good hygienic conditions. The amount of such milk at present available for public consumption is an almost negligible quantity in comparison with the total public demand for milk. Moreover, the expense of placing such milk upon the market to the exclusion of other milk would be prohibitive, and it is doubtful whether this or any other country will ever be able to say that nothing but milk of this character is sold.

Other persons go to the opposite extreme, and maintain that any and all milk which comes from the udder of a cow should be allowed to be sold free from any kind of restrictions whatever. The reason they give for this view is that such milk is, in their opinion, absolutely genuine, and therefore should be sold to the public for whatever price milk is fetching at that particular time. It does not matter whether it contains only 2 per cent of butter fat, whether it is filthy, dirty, whether it is from a tested or an untested animal, or anything else. It is so-called genuine milk, and therefore above suspicion. This line of argument is just as ridiculous and impossible as the former, but nevertheless it is seriously put forward by a certain number of people.

Let us make a really serious endeavour to get at the real essence of this question of grading milk. Try and look at it with an absolutely open mind, free from all preconceived ideas, and with an honest intention to see where the actual facts of the case lead us. That is a difficult thing to do, of course; but the question is tremendously important, and demands precisely that kind of consideration.

The outstanding facts which have to be taken into account in estimating and judging this matter are briefly as follows :—

(*a*) Milk, as has been already shown, is an absolute necessity for a certain section and proportion of the community.

(*b*) It is very important that it should constitute a large part of the diet of the young for a period beyond that when it is absolutely necessary.

(*c*) It is a most valuable food, amongst other foodstuffs, at all periods of life, on account of its actual composition and the ease with which it can be digested by most people.

(*d*) There is not a sufficient amount of milk produced in the country to supply it in that quantity which young children ought to get at a reasonable price. It is sold to the public at a flat rate of so much per imperial measure, quite irrespective of its nature, quality, and condition; and this price is fixed by the ordinary processes of supply and demand, thus varying at different times of the year and in different places.

(*e*) It is perhaps the only foodstuff which is sold to, or delivered to, practically every house in the country once or twice daily.

(*f*) It is the only important foodstuff which is produced naturally once or twice, or even three times, every day in a condition ready for sale. Owing to its perishable nature, by reason of the ease with which decomposition sets in, it must be retailed to the consumers as quickly as possible, and of necessity within a short period.

(*g*) No other important foodstuff is so easily tampered with and adulterated. This is due to its being a liquid of very varying composition and strength.

(*h*) In order to protect the consumer from fraud, and to see that he gets an article of at least a fair average food value, and to punish those proved to have tampered with it or adulterated it, milk is at present sold under a regulation which presumes that all milk containing less than 3 per cent of butter-fat and 8·5 per cent of non-fatty solids is not genuine, and that the vendor of milk below that standard has either abstracted fat or added water.

(*i*) As a matter of fact, it is proved to the hilt that the different constituents of milk vary considerably in perfectly genuine samples, and that in a certain number of cases genuine milk from the cow falls below this presumptive standard.

It is not known with certainty within what limits these different constituents do vary in genuine milk, though it is fairly well known what the *average* is, taken over a large number of samples.

These are the outstanding and principal facts which have to be taken into consideration in discussing the question of how milk should be sold. The mere enumeration of them is sufficient to indicate that we are dealing with a highly complex natural product which exhibits great differences in different samples, though of fairly average composition when bulked together in sufficient quantity. It is quite well known to milk producers, and has been abundantly proved by the evidence taken by different investigators, that if the whole of the milk from a sufficient number of cows fully milked be mixed together, the average analysis of such mixed milk is well above the present presumptive standard. That is because, if a sufficient number of cows be taken, the rich milk from the best makes up for the poor milk from the worst, and the average is good. This is, of course, the scientific basis for the commercial system of mixing all the milk received at a depot before it is retailed.

The obvious criticism then suggests itself: Why not insist upon all milk sold to the public being bulked in sufficient quantity to ensure a fairly high average quality? It will be admitted at once that if that could be done—possibly it might be—it would solve the whole question. If all milk were bulked in this manner before being retailed, there would practically never be found a sample deficient in fat or other constituents, and there would then be placed upon the market one grade only of milk, and that would be the average of the milk supply of that particular area. To the mind of the present writer that would be an eminently satisfactory solution; but it must be clearly recognised that the legal provision for such a system of milk distribution means the absolute extinction of the small producer-retailer, who sells milk to his own particular customers from one, two, three, or four cows. At the present time there are thousands of such men in the milk trade, particularly in villages and rural districts. There are also quite a number of these men living on the outskirts of larger towns and cities, who drive their own carts into these towns and supply their own customers. There are also a large number of very small retailers who get small quantities, say two or three gallons, of milk per day, and retail this. In all these cases the milk may at one time or another happen to fall below the standard. The fact remains, however, that the bulking of milk on a large scale is one obvious method of securing a good average quality of milk, which would then be of one single grade. The present writer holds the belief that sooner or later this will be the system adopted in all the larger towns. It would make for great economies in distribution and handling, it would eliminate many causes of accidental contamination, it would simplify very much administration and supervision, and it would secure that all classes of the people obtained a good supply. But—and the condition is a very serious one—it must involve the elimination from the Milk Industry of the small dealer.

Assuming, for the sake of argument, and for the further examination of this problem, that the foregoing solution is for the time being outside the realm of practical politics, either because the legislature would not agree to it, or that it were considered by the community to be a harsh proceeding, or for any other valid reason, what is the alternative? Assume also that it be agreed that the present system of selling any kind of milk at a flat rate is unfair to all concerned, is there no other method by means of which the producer of milk may be encouraged to provide as good and clean and healthy an article of food as he possibly can? Is there no other way of supplying the consumer of an essential food with that food guaranteed to be the article demanded? Can we not imagine a reasonable system which will do both these things—namely, reward the best producers for their enterprise and skill, and at the same time supply the public with milk of known quality, associated therefore with a price according to that quality? Surely there is nothing in such an idea which ought to present insuperable difficulties. After all, it is exactly what happens with every other article of commerce, from boots to champagne, including all other foods. One cannot think of anything of any importance to the community which is sold at a flat price, under ordinary conditions of trade, utterly irrespective of its quality. The milk producer himself buys everything on this principle, even his cows, and, of course, his feeding-stuffs. The absurdity of the situation is that under the present system the man who buys the poorest of cows (from the milk point of view) and the man who buys the very best of cows (from the milk point of view) both sell their milk to the public for precisely the same price. They sell nothing else on that system, and can purchase nothing at all in the same way. The suggestion that milk should be sold for a price which varies according to the quality of the article seems to the present writer so obvious as to require no proof whatever. And yet it is amazing what a number of persons seem to think otherwise. Milk has always been sold at a flat rate, irrespective of quality, in this country, and therefore, presumably, it must always be sold in that way for ever and ever. It was good enough fifty years ago, and therefore it is good enough for to-day and the future. Well, nothing will ever convince people who take up that line of argument, no matter what the subject is. It may be said, however, that it is not one which ought to commend itself to the intelligent and progressive members of a great national industry such as the milk trade. As a matter of fact, of course, a great deal of milk has been and is being already sold at prices according to its quality; but this milk goes to creameries and factories, which are especially interested in the manufacture of milk products such as butter, and the managers of these creameries are not particularly anxious to buy water; what they want is butter-fat. They therefore pay for their milk according to the percentage of this constituent, or else they buy no milk below a given percentage, which is in every case very considerably higher than the 3-per-cent presumptive standard. In other words, they buy their milk as they buy their clothes, their meat, their feeding-stuffs, and their motor-cars, according to the quality of the article purchased. Only the unfortunate general public, the national consumer, cannot do this. He is compelled to take anything that is given him in the shape of milk at a flat rate, which is, of course, always the price of the best milk on the market. The dishonest milk vendor is thoroughly well aware of the fact that he can add a gallon of water to every six gallons of milk containing 3·5 per cent of fat, and still retail his milk at the present legal presumptive standard, and the public have no protection. Unfortunately it is the poorer people who suffer most, for they buy their milk in small quantities from a shop or a cart, and consume it at once. They cannot afford to have a sample analysed, or are unaware that they can have it done for them, or in any case they just take what is given to them. The law, which protects them in the matter of quality of many foodstuffs, fails lamentably under the present system of dealing with milk. If they go to the butcher they have a choice of different qualities of meat, from mince to the very best steak, with a varying number of grades between, and they can select what they want according to their means and taste, and pay for it at a corresponding price. The same applies to every other thing they purchase. The single exception is milk—which is the most important thing of all for them. It has actually been argued by some, who apparently wish to appear anxious for the protection of the poorest people in this matter, that the grading of milk would operate harshly against them. Is it not perfectly obvious that it is the only possible way to protect them? Is there any other conceivable manner in which they can be certain of securing an article which corresponds in quality to the price given for it? One knows of none. If it be said that the poor could not afford to buy the highest quality of graded milk, the answer is that there is no reason whatever why they should. There is no reason whatever why anybody should buy it, any more than they should buy the highest quality, and therefore the dearest quality, of any other commodity. What is essential is that there should be a guaranteed grade of milk, which is sufficient for all the purposes of infant feeding, available at a moderate price for the whole community, not merely one class. Very few people can afford to buy the best of anything. Some can afford to buy the best of one or two articles, for which they have a special desire, and they do this by doing without other things, or by buying inferior qualities of other things. High-grade quality milk is a luxury, not a necessity. It is not essential for any one, and least of all for those who must have milk to live. If it were bought for infant feeding, it would have to be diluted for a certain period of life. But if people, rich or poor, wish to obtain, and can obtain, a very high quality of milk, they should be able to do so by paying a corresponding price, which will offer a fair return to the producer. In fact, there is no other conceivable way in which one can encourage the production of high-quality milk except by making it financially worth some one's while to produce it. The more of such milk there is the higher will be the general quality of the whole supply. For all ordinary purposes a 3 per cent milk is quite good enough, and the greater the quantity of milk produced of a higher fat content than that figure, obviously the greater will be the supply of milk at 3 per cent. The fat in the milk is the great energy-producing element of the food, and hence it is quite a proper standard to take when selling milk for adults. So long as there is a reasonable amount of fat, say 3 per cent, there is no good reason whatever why a much richer milk should not be reduced to that figure by the addition of skimmed milk, which contains all the other constituents. This system of toning down the milk, as it is termed, should be encouraged under a method of grading, in order that the total supply of a milk of good average quality—a quality amply sufficient for all ordinary needs—would be available to the general public. A certain amount of fat could be retained for cream and butter, and an immensely larger total bulk of good average milk placed upon the market at a reasonable price. The result of that would be of immense benefit to the nation as a whole. This, of course, would involve a change in the law affecting the sale of milk; but such a change would, we are persuaded, be a beneficial one, and entirely in the interests of the community at large.

The question then arises, if milk is to be graded before being sold, upon what basis is this to be done, and what are the grades of milk which should be or might be placed upon the market. The former is by far the most important consideration, because it involves questions of principle, while the latter is simply a question of commercial or administrative convenience. Let us turn our attention for a moment to the principles which should underlie any system of grading of milk.

We may note first what has been done already in this matter in various places. The aspect of the subject which apparently has appealed most to those interested has been that of cleanliness in production and handling. One can quite understand why this should have been so. It is doubtless because the people who desired to effect reforms in this direction were those who were specially interested in the subject of infant welfare, infant feeding, and infantile mortality. The problem was therefore approached from the side of infantile public health more especially. It was quite well that this should be so, and the efforts of those in America and elsewhere to improve upon the old condition of affairs by providing cleaner milk deserve the highest possible praise and encouragement. Those who approached the subject from this side realised that, speaking broadly, the hygienic standard of any given milk could be best estimated by counting the number of bacteria present in the milk at varying periods after its production. This method is quite sound. Milk is an admirable medium or nidus for the growth of microbes, and the number of these present at any given time affords an excellent test of the cleanliness and care with which it has been handled in the course of its journey from the cow to the consumer. From the moment the milk leaves the udder of the cow, it is exposed to microbic contamination from a great number of sources. The hands of the milkers, the hairs and skin of the animal, the air of the byre, the milk-pail and other utensils, the atmosphere in general in the milk-house, the depot, the dairy, the street, and the consumer's household—all constitute possible and probable sources from which microbes may enter the milk. Some, particularly the tubercle bacillus, may be in the milk even before it leaves the udder of the cow. From whichever of all these and other sources the microbes come, they grow and multiply in the milk unless prevented by artificial means. These facts being known, it was quite easy for bacteriologists to make a count of the microbes present in milk obtained under different conditions, and thus ascertain what the average numbers were at different times and under different conditions. After a sufficient number of experiments of this sort had been made, it could be said that milk from a healthy cow which was kept clean, milked into a clean sterilised pail by clean milkers, and handled subsequently with due protective care, ought not to contain more than a given number of germs in a given quantity of milk. But when this figure was arrived at in this manner, it was also found that ordinary fresh milk as sold commercially contained many times the number of bacteria of milk produced under the conditions mentioned. The promoters of the clean-milk supply therefore urged that inasmuch as this great microbic impurity was easily preventable, and required only careful attention to a few simple hygienic rules, it was not too much to ask that these should be made compulsory. It was not a question of expensive buildings, or elaborate equipment, or great financial outlay, in any one direction, but merely that of personal attention to hygienic details. Once this conclusion was firmly established, certain cities in the United States proceeded to grade their milk upon these lines, and laid down regulations under which no raw milk might be sold for human consumption which contained more than a given number of bacteria per cubic centimetre of milk.

It is very interesting and important in this connection to have some idea of the relative difference of the microbic content in milk produced in the ordinary haphazard way, and milk produced under careful hygienic control. The National Clean Milk Society in England, in order to ascertain the condition of affairs, caused an examination to be made of the milk supplied to twenty-one different London hospitals. The result was to show that the number of bacteria present was greatly in excess of what should have been the case under clean methods of production. In one instance, 250,000,000 bacteria were found per cubic centimetre of the sample. This was quite an exceptional figure, but bacterial counts of from 3,000,000 to 9,000,000 are by no means unusual. In the years 1916 and 1917, Professor Délépine of Manchester examined the milk of thirty samples delivered to the Manchester hospitals. He found that of these 64 per cent contained over 1,000,000 bacteria per cubic centimetre. Now, the health authorities in America, as the result of their investigations, had laid it down that no raw milk containing more than 30,000 bacteria per cubic centimetre should be permitted to be sold for human consumption. This was the standard applicable to the city of New York. If this standard had been operative in Manchester, the whole of the 64 per cent of the samples examined by Professor Délépine would have been condemned for ordinary use, and could only have been sold for purposes of cooking or manufacturing. The sale of such milk as food for children would have been absolutely prohibited. More than this, it must be remembered that it is quite probable that a certain amount of this Manchester milk had been treated commercially by one of the so-called processes of pasteurisation. In any case, it was far beyond the limit of bacterial contamination laid down in New York.

In the Final Report of the Astor Committee (page 77) will be found a table which shows the bacterial count of milk supplied by twenty-eight different dairymen to mothers attending infant-welfare centres in London. The lowest number of bacteria present in all this series is 98,000 per cubic centimetre. The highest is 104,300,000, with every kind of figure between the one and the other. These high bacterial figures do not mean that the milk contained the germs of disease. They simply show the absence of proper care and cleanliness in the whole process of handling milk from the cow to the consumer, and especially they indicate that the milk had not been properly cooled immediately after production. There are very few bacteria present in the milk as it comes from a healthy cow. If that milk is at once cooled and kept cool, and care taken to prevent contamination from extraneous sources, it is quite a simple matter to deliver it to the consumer at a bacterial standard such as that set up by the health authorities of New York. The danger of milk containing great numbers of bacteria is not so much the infection of definite diseases as that of causing digestive troubles in young children. The question of the presence of the bacillus of tuberculosis is, of course, a problem of its own.

The knowledge obtained on these lines has led to the suggestion and the practice that milk should be graded according to the number of bacteria present in it, or in other words, according to the hygienic condition under which it is produced and handled. As has been said, this system of grading has been introduced in some places. It may be asked, however, if hygienic conditions of production and handling are all that is necessary to keep down the number of bacteria in milk, or to prevent their multiplication, why should these conditions not be made universally compulsory. Why should a milk producer, or a milk distributor, or a milk vendor be allowed to treat his milk in such a way that it is liable to bacterial contamination at every stage? Why should a milk seller expect to get a higher price for his milk simply because he has taken ordinary precautions of cleanliness in dealing with an important article of food? Why indeed! To the present writer it appears that there is no justification whatever for any such expectation. It would seem to be a primary duty on the part of the public health authorities to insist upon such necessary care being taken by every one engaged in the industry. The mere fact that a man handles a perishable food commodity of great value with ordinary cleanliness surely does not entitle him to demand an extra payment for doing his obvious duty. The public, however, have a perfect right to demand that such persons only should be allowed to be registered, or to engage in the business. If a milk producer will not keep his premises clean, or his cows clean, or see that his milkers are clean, or that his utensils are clean, and so forth, then it should be the business of the public health authority to say that he should not engage in that trade. It is not a question of finance or capital expenditure; it is simply a question of personal habits and attention to a few common-sense rules of hygiene. One may see milk being produced in a filthy condition and handled without any regard to cleanliness in a splendidly built byre with every modern equipment. One may also see the small producer with two or three cows, with very poor buildings and no great facilities, exercising such scrupulous care and cleanliness in every possible detail that, judged by this criterion, his milk would be infinitely better than that of the former. It is not a question of expense; it is a question of methods. Good methods cost no more than bad ones. They are, therefore, in this opinion, not a legitimate claim for additional price. Their absence, however, is a legitimate reason for a condemnation of the milk supplied.

One therefore comes to the conclusion that the grading of milk on the basis of bacterial purity alone is not a sound procedure. The writer believes that such purity ought to be insisted upon by the health authorities, and ought to be regarded as an essential condition to be complied with by all those engaged in the Milk Industry. In this matter the present argument goes further than the advocates themselves of a clean milk supply, because here it is regarded as not merely a matter to be encouraged, but a matter to be insisted upon.

There is, however, one form of milk grading on a bacteriological basis which stands by itself, and has nothing in common with that dependent upon the bacterial count. This is what is called tubercle-free milk—that is to say, milk which is certified and guaranteed to be the produce of cows which have been tested for tuberculosis and certified as free from that disease. This milk has a value all its own, and there is no possible objection—indeed, it is very desirable—that such a grade of milk should be placed upon the market for those who have sufficient wisdom to pay the extra price for it. It is the one case in which a bacterial standard is all-important. The value of this milk, however, is not exactly the same as the bulk of the milk supplied for the general purposes of the entire community. Milk from a tubercle-free herd is essentially an infant's milk. Human tuberculosis, in so far as it is conveyed by tuberculous milk, is a disease of children, manifesting itself in disease of glands and joints. It is a very common cause of tuberculosis of this form, as the statistics of our children's hospitals prove all too clearly. One can hardly imagine a greater boon to the infantile population of this country than an adequate supply of milk from tubercle-free herds. Unfortunately, at the present time very little milk of this kind is available. Tuberculosis of the cow is so widely prevalent in Great Britain—probably some 30 per cent of the cows of the country being more or less affected—that it must be a very long process before any large proportion of the total milk supply can be regarded as safe from this point of view. Those producers who have gone to the trouble and expense of eliminating all reacting cows and building up a tubercle-free herd have done a fine work, and they should be recompensed financially in the price they get for the quality of the milk they supply. In this case it really does not matter very much what the chemical composition of the milk is. Even if its butter fat content is only 2·5 per cent, it is still quite sufficient for all nutritive purposes during that period of infant life when milk is the essential article of diet, and the fact that it can be guaranteed free from tuberculosis is an overwhelming quality in its favour. Furthermore, one may regard it as fairly certain that a milk producer who has gone to the trouble and expense of building up an accredited herd of the kind mentioned will also be careful to see that his milk is produced in a hygienic manner. As a matter of fact, most of this milk which is upon the market is cooled and bottled at once at the place of production. There is no doubt that a grade of milk of this kind produced for the special purpose of infant feeding is extremely valuable, although a purely bacteriological grading, and irrespective of its chemical quality.

There is, however, an entirely different basis upon which milk may be graded, and that is according to its chemical constituents. Regarded as an article of food, all milk is not equally valuable simply because it is genuine, or simply because it is clean. Its value as a foodstuff for the community at large depends upon what it is made of, and in particular, after infant life, upon the amount of fat contained in it. In other words, a fat standard for milk is not merely a convenient one to take from the point of view of analysis, but it is scientifically a sound guide as to the value of any particular sample of milk as food. Under the present law, and under the present system of the Milk Industry, all genuine milk is sold for the same price, utterly irrespective of its food value. A pint of milk bought from a dairyman costs exactly the same to the purchaser whether it contains 3 per cent or 5 per cent of fat, whereas, of course, the latter is worth much more as a food than the former. We would go so far as to say that there is only one just and satisfactory manner in which any foodstuff (and therefore milk) can be bought and sold on fair terms to all concerned. That method is the one by which a given quantity of the foodstuff in question is bought and sold at a given price for a given quality. This is the system which regulates the purchase of practically everything one can think of except milk. One cannot imagine consumers paying the same price for meat, tea, or any other material, irrespective of the quality purchased. It is hardly necessary to labour the point. It is a question of ordinary commercial experience. It therefore follows that the same principle ought, in justice to both producer and consumer, to apply to milk. Under present conditions there is no inducement to the producer to grade up his milk to a high standard of chemical quality, because unless he sells it to a creamery which buys on a fat basis, he gets no more for 4 per cent milk than for 3 per cent. The unfortunate consumer, on the other hand, pays just the same price for whatever kind of milk he gets, and the result is that there is a tendency to sell the best milk in the best parts of our towns and the worst milk in our poorer quarters. That is because the wealthier class of purchasers will change their dairyman if they are not satisfied with the quality of milk they are getting, whereas the poorer people are often compelled to purchase what is brought to their doors. As far as we can see, the only way to protect the poor and to ensure that they get a decent quality of milk for a fair price, is to grade it according to the quality sold. That does not mean, of course, that the poorest people can afford to buy the best milk, nor is there any reason why they should. Nobody need buy high-grade milk unless they like. It is simply a luxury; but if it be graded according to its quality, and if added to this the law should say that *no milk should be sold at all unless it be of a fair standard*, sufficient for all ordinary purposes, then, and then alone, everybody is placed upon the same footing, and can please themselves what quantity and quality they buy at their respective prices. There is no particular object in buying 5-per-cent milk unless it is required for the cream or fat obtained from it. From the ordinary food point of view, from the ordinary household point of view, a lower standard of milk than this, at a correspondingly low price, is quite adequate to meet all needs.

It also seems fairly obvious that if a system of grading of milk according to its chemical quality were in operation, the tendency would be for the quality of milk produced to rise. Producers would all be anxious to get as much milk of a high chemical quality as they possibly could. It is the only way in which any inducement can be offered to the producer. There is no hope of producing any kind of article unless it is made financially worth while to do so. In this respect milk production does not differ from any other production. For these reasons the writer is firmly of opinion that the Milk Industry will never be put upon a satisfactory basis, either to producer or consumer, until arrangements are made to bring it into conformity with the ordinary commercial principle of selling a given quantity of an article of a given quality for what it is worth. He therefore favours a system of grading which *takes into account* the chemical composition of the milk. For this purpose the percentage of fat contained in the milk is a convenient and quite satisfactory method of estimation.

This is by no means to say that no account should be taken of cleanliness as estimated by the bacterial count. Indeed, it has already been said that in the writer's opinion the latter should be insisted upon. The Astor Committee, which considered methods of grading, reported (page 20, paragraph 86, Final Report) that in their opinion "the two most useful and practicable methods of grading milk are as follows:—

"(1) Supervision through inspectors of the methods of production and handling.

"(2) Examination of the milk as sold in relation to specified chemical and bacteriological standards. (Chemical standards usually require not less than certain definite percentages of milk fat and solids not fat, and the bacteriological standard requires that samples shall contain not more than a specified number of bacteria per cubic centimetre.)

"The first of these demands a large staff of qualified inspectors, since conditions are imposed both as regards the health and housing of the cows and also the care and cleanliness shown over every detail of milk production and distribution. The second demands skilled technical workers for both methods of examination. A combination of both of the above methods would appear to be necessary in order that the nutritive quality of the milk may be guaranteed, and that it may be cleanly produced and kept free from contamination until it reaches the consumer." With this conclusion the present writer is in complete agreement. It takes into account all the important factors concerned. The only point upon which it is desired especially to insist is that the supervision of the methods of production and handling should be a matter of public health administration, which should be obligatory upon all concerned in milk production. That done, it seems quite obvious that the nutritive quality of the milk, as estimated by its fat content, should then be taken as the basis for grading, and the price for the milk charged accordingly.

But it may be argued—and, indeed, the argument is frequently put forward—that it would be very difficult for those engaged in the trade to sell different qualities of milk, and very difficult also for those engaged in administration to supervise such a system. The simple reply to this is that it is already done in connection with practically everything else, and does not appear to cause any one any inconvenience. It is merely the novelty of the idea, and the inherent conservatism of traders, which makes difficulties which would be found to disappear in actual working. If we are asked how could the price of different qualities of milk be fixed, our answer is, by the ordinary laws of supply and demand, just as the prices of anything else are fixed. It is said by some that there would be no demand for a quality of milk of high grade. If that proved to be the case, obviously no one would sell it as such. There is no reason, however, to suppose for a moment that that would happen. All commercial experience is the other way—namely, that there is always a certain market for the best quality of anything. Then, it is asked, how could a trader be supervised if he sold several qualities of milk? To begin with, it is quite possible that he would elect to sell only one quality; but if he did choose to sell more, he would be precisely in the same position as a grocer selling several qualities of tea, except that the public could more easily check what he sold.

While therefore strongly of opinion that the grading of milk is a much-needed reform, the writer does think also that the grades should be fixed by law on the following lines. Any classification of milk for grading purposes ought to be as simple as possible, so that the grades should be clearly recognised and readily understood by the general public—this is also necessary in order that administrative supervision may be readily secured and be as simple as possible; and, finally, grading should be simple in order that the carrying on of the Milk Industry may be encouraged with the minimum of interference compatible with efficient inspection. The writer's suggestion would be to grade milk for ordinary consumption into two main grades, one of which might be termed *standard milk*, below which milk should not be sold for ordinary consumption. In addition, there might be one high-grade milk containing an appreciably higher amount of fat. In addition to these two main grades, provision should be made for the sale of tubercle-free milk, irrespective of its butter-fat content; and provision should likewise also be made for the disposal of other milk which might fall below the fat content required for standard milk. A simple system of grading on these lines would not be at all difficult to administer or supply, and in the writer's opinion it would be of immense benefit to both producer and consumer.

MILK IN TRANSIT.

Immense quantities of milk in this country are carried very great distances before delivery to the consumer. It is no uncommon thing for milk to be sent distances varying from 50 to 200 miles, or even more. But the conditions of this transit leave very much to be desired. Too often the milk-churns stand for hours on station platforms, or in open trucks, and are frequently mixed with all kinds of other goods. There is no satisfactory railway van in use in this country for milk transit. In Denmark and in the United States special refrigerating vans are used for this traffic, in which the milk is kept cool, and it is high time that some effort was made in this direction here. There ought also to be a special place set apart for milk at those railway stations where milk arrives in great bulk. To watch the handling of the milk traffic at such a terminus nowadays is a splendid object-lesson in how it should not be done. In one station which we have in mind hundreds of empty milk-churns and milk-butts may be seen standing on a part of the station premises awaiting return, exposed not only to all the air and dust of the ordinary traffic, but actually in that part of the station into which the railway servants sweep all the dust of the platforms. It ought to be illegal to open any churn of milk at a railway station, and yet there is a large city in Scotland at which most of the milk supply arrives by rail early in the morning, and all this milk is opened and handled and mixed, and subdivided by the retailers, who come with their carts, and carry on all this work in the open air on the station cabstand. These are simple questions of unsanitary procedure, but they go on unchecked. Milk sampling ought not to be done at railway stations. Churns should not be opened there for any purpose whatsoever, unless a proper clearing-house is set apart for milk business. Incidentally, it may be remarked that the old wooden milk-butts for carrying milk are still all too common in Scotland. With their filthy rags and the impossibility of easy cleaning, they should be utterly abolished. There is nothing in their favour except their durability. The subsequent transit of milk in the process of delivery to customers also offers further opportunities of contamination. One may see every day milk being delivered in the streets of our towns in a cart which contains one or two large churns, each consumer's milk being measured out by a dipper in the hand of a man in charge. All the sources of street contamination, such as dust, dirt, manure, and flies, are allowed full sway. Is it any wonder that by the time this milk is transferred to the consumer's jug it will be usually found to have a very high bacterial count? In many cases, no doubt, this is immediately added to by the methods of treatment in the consumer's own household. Too little care is taken to have the jugs or basins thoroughly scalded before the milk is put into them, and after that it is very often left exposed on the kitchen table—the hottest place in the house—to be used as required. The ideal method of delivery, of course, is for the milk to be bottled while it is cool, delivered to the consumer in sealed bottles, kept by the consumer in these bottles in a cool pantry, and only taken out as it is required. This system of milk delivery is very common in America, as well as in Paris. There is no doubt that the whole question of the handling of milk in transit constitutes one of the gravest problems of the modern industry, and the milk supply of the country will never be satisfactory until the points above referred to secure adequate attention.

COST OF PRODUCTION AND DISTRIBUTION OF MILK.

One cannot help feeling that the price of milk to the consumer to-day is more than should be paid for an article of diet of such supreme importance to infant welfare. The price of milk, of course, at any time must depend principally upon the cost of production and the cost of distribution. As regards the cost of production, it may be suggested that there are certain lines of procedure to which more systematic attention might be paid than obtains at present. A good deal of evidence has been laid before different committees on this point, showing that there are great variations in the cost of production according to the manner in which the dairy herd is managed. Dairy farmers would do well to pay more attention to the details of their herd management, and would probably find that various economies might well be arranged without interfering in any way with the efficiency of the result. For example, to mention only one point, far too little attention is paid to the economical and scientific feeding of dairy cattle. Too many farmers still adopt the practice of giving precisely the same kind and quantity of food to all their cows irrespective of the individual peculiarities of the latter. There is much waste in such a system, which has been abandoned by the most progressive producers. The keeping of food records, with their results, for individual cows is strongly advocated in this connection. A cow is like any other animal or human being: it will do its best work and give the most satisfactory result on a diet which has been carefully studied to meet the requirements of the individual. Then it is very important that dairy cows should be bred only from bulls which show a good milking strain. This again involves the question of the keeping of records over a period of years and generations, and is a point all too frequently overlooked. With reference to the production of milk in summer, there is a good deal of evidence showing how the quantity and quality of pasture on dairy farms can be improved, with the result of a less cost in production. Knowledge of the most suitable methods of manuring summer pastures should be more widely disseminated. An experiment quoted in the Astor Committee's Final Report gives the treatment of two plots of land of equal area, in which the increase per acre per annum from manurial treatment was ninety-two gallons of milk which, after allowing for the cost of the manure, showed a profit of £1, 19s. per acre per annum when milk was at 6d. per gallon. The Report states that forty acres of manured pasture should produce as much milk as fifty unmanured acres. A very important saving of expense also might be obtained by the combination of a number of small farms for the purpose of purchasing feeding-stuffs and manures, and the higher the prices of these articles, both for purchase and delivery, the greater would be the economical advantage of co-operation on these lines.

As regards economy of distribution, one has only to observe the methods at present adopted in any town to see what a waste there is both in labour and transport. Half a dozen milk-carts, representing as many retailers, deliver milk at the same time in the same street to different people. A most striking example of economies effected in distribution is that of the United Dairies Limited, London, which, as the result of their organisation and reorganisation, reduced the number of their rounds from 2744 to 1944, and the numbers of the horses used in their milk distribution from 1217 to 517. It does not follow, of course, that such trade combinations pass on their economies in distribution in the shape of cheaper milk to the consumer, but it does follow that milk can be made cheaper only by the practice of such economical arrangements. It would seem as if the future might show some central organisation which would organise the distribution of milk in the interests of the consumer.

MUNICIPAL MILK SUPPLIES.

It is the firm opinion of the present writer that in certain places in the country the milk supply will never be satisfactory until it is undertaken by the municipality. He is well aware that in arguing for municipal trading in milk he is treading upon delicate ground, and advocating a system which has many opponents. That, however, does not alter the fact that in a certain number of places, and under certain conditions, there seems no other satisfactory solution. He does not suggest that every municipality should own and conduct its own milk supply, but where it is found that the ordinary working of trade competition, and so forth, fails to give the inhabitants a proper amount of milk of decent quality, then it is an elementary duty on the part of the public health authority (that is, the local authority) to provide it. It is no less important than a water supply, or a gas supply, or a tramway system. Indeed, it is much more important than the two latter. The law of the land should be so amended as to provide that in the case of any local authority finding its population unable to get sufficient milk from any cause whatever, that local authority should be enabled to take steps to supply that want, after having satisfied some central department of the needs of the situation. It would be the business of that central department to lay down such conditions as they thought fit to protect the interests of the ratepayers concerned, and to see that such schemes were only undertaken in cases of real necessity. To the writer's mind this proposal is a very elementary one in public health administration.

PASTEURISATION OF MILK.

The whole question of the sale of pasteurised milk and the processes concerned under this general designation is at the present moment in such a chaotic condition that it is necessary to deal with the subject in some considerable detail. It is one of the most urgent problems of the modern Milk Industry in large communities. An immense amount of milk in this country, especially in our larger towns, is "pasteurised", before distribution to customers. And yet, strange to say, nobody knows what is meant by the word. The process of so-called pasteurisation has *no precise legal or scientific definition.* The present writer has made inquiries from a number of large milk vendors as to whether they do or do not pasteurise all or most of their milk. In the great majority of cases the reply is that they do pasteurise their milk. The next question is—What process is the milk subjected to? The answer in every case is different in some particular. In other words, a milk vendor can do something or other to the milk he buys—almost anything he likes, in fact—and come to the conclusion that he has pasteurised the milk. Almost the only thing that all these commercial processes have in common is that the milk so treated is heated up to a certain point before being sent out to customers. The proper meaning of the word pasteurisation is the heating of the substance concerned to such a temperature as will prevent abnormal fermentation. The word, of course, is derived from the famous observer Pasteur, who was the first to apply this heating process with this object in view. It was not very long before it was realised that heating milk in this way would produce certain advantages, particularly the prevention of souring for some time. As applied to milk, therefore, the process of pasteurisation meant the heating of milk to such a temperature as would prevent it souring. This temperature was found to be considerably below the boiling-point if applied for certain periods of time. The limits of temperature advocated for the pasteurisation of milk have been as low as 60° C. and as high as 90° C. The time advised during which the milk should be subjected to these temperatures has varied from a minute or so up to an hour, according to the temperature used.

As the term pasteurisation is used in the Milk Industry to-day, however, it is usually meant to include a further process than heating—namely, that of rapid cooling immediately afterwards.

In fact, all that one can certainly conclude when a milk vendor says that he pasteurises his milk is that he heats it to some extent for some time, and afterwards cools it.

In the mind of the general public, however, pasteurisation has a somewhat different significance. When people choose definitely to buy pasteurised milk, they do so because they believe, rightly or wrongly, that the milk has been so treated as to ensure the destruction of all or most of the dangerous living organisms of disease which may have been present in the milk, and that the milk so treated therefore may be given to their children with a degree of security which does not apply to fresh milk. More particularly they have in their mind that the danger of the conveying of the bacilli of tuberculosis has been removed. The same, of course, applies to other pathogenic organisms ; but there is no doubt that the disease of tuberculosis in children is the one most associated with milk, and quite rightly so.

It is very important indeed to recognise that there are two distinct objects in view in the pasteurisation of milk ; one is the commercial aspect, and the other is the public-health aspect. The milk vendor who pasteurises thousands of gallons of milk per day, which he is distributing to the population of a large city, is not worrying primarily about the possibility of the milk carrying infection. His business is to get that milk distributed somehow or other before it goes sour, and he has found by experience that if he puts this milk through a process which he calls pasteurisation, the *commercial life of the milk* is very considerably prolonged. It saves him great financial loss from milk which would otherwise be unfit for distribution. That is quite a legitimate trade operation, and all to the good, as far as it goes, for the population concerned, who otherwise, in many cases, would get insufficient supplies. But it does not by any means follow—and this point must be emphasised—that the process of pasteurising of milk, as carried out by the trade to-day, can be guaranteed to destroy the germs of disease which may be in the fluid. Some of these processes will kill some of the germs ; others are almost useless from this point of view. They are not designed for this purpose, and they are not controlled from that point of view. In fact, they are not controlled at all. It is open to any milk dealer to do anything he likes with his milk, and tell himself and the public that it is pasteurised, leaving both to draw their own conclusions. One of the greatest and most essential reforms which is urgently needed in the modern Milk Industry is that there should be a legal definition of what is meant by pasteurisation as applied to milk, and that the process should be continually under public-health inspection. Furthermore, it should be added that only milk so treated should be sold as pasteurised milk; and, still further, that no milk should be sold as fresh milk which has been subjected to any process of this kind. In other words, in this matter, as in all other milk matters, the public have a right to know exactly what they are buying.

The present writer recently carried out an inquiry for the Astor Committee to ascertain the position of pasteurisation of milk in Scotland. The full report of that inquiry will be found as an appendix to the Final Report of that Committee (page 66). It gives the condition of affairs in all the burghs with a population of over 10,000 (with three exceptions) where milk is pasteurised, together with the list of those places which do not pasteurise any milk. Very briefly stated, the facts brought out by that inquiry may be thus summarised.

A large number of burghs exist in Scotland in which no milk at all is pasteurised, and these burghs are all small in population. In most of the larger burghs in Scotland from one-third to one-half of the milk distributed undergoes some process of this sort. In the great majority of cases, the so-called pasteurisation that is carried out consists in raising the milk to a given temperature *for a moment or two*, and then immediately cooling it. In other words, as it is usually carried out, the process is quite useless from the point of view of the killing of disease bacteria, owing to the short period of exposure to the temperature employed. This inquiry also showed that in the majority of instances the night and the morning milk is mixed together before being pasteurised. Finally, in nearly every case, this pasteurised milk is sold to the public as fresh milk without any declaration of any kind whatever.

It is therefore quite clear that the pasteurisation of milk as carried on to-day is a purely commercial operation. It is none the worse for that, but its results and limitations should be quite clearly understood from that point of view. Even as a commercial process, it is important that certain definite objects should be secured. The milk should be heated to such a temperature as will destroy most of the bacteria present, and at the same time that temperature should not be so high as to convey to the milk any scorched flavour.

Whether this result is obtained or not obviously depends upon the temperature selected for the heating of the milk, and the length of time to which the milk is exposed to this heat. The idea is that, having destroyed by this temperature the great majority of those organisms which might give rise to souring and putrefaction, the immediate cooling of the milk will then be a sufficient preventative of the multiplication of any germs which may happen to have survived the action of the heat. Even in the haphazard way in which this process is carried out by most milk traders these results are very generally obtained. There is no doubt that the ordinary commercial process of pasteurisation does enable the milk vendor to deal with milk coming from long distances, and to distribute that milk in a saleable condition over a much wider range of customers and for a much longer period of time than could be done if it were not so treated. That is the justification of the process as carried out, and that is its object. In addition, even the imperfect methods at present adopted have their public-health value. The balance of the evidence available certainly shows that some diseases which affect particularly infant mortality (such as infantile diarrhœa) have certainly diminished in those cities where the milk distributed has been treated in this way. A temperature which will destroy most of the souring and putrefactive organisms in milk will also be to a considerable extent a safeguard against the infecting germs of diphtheria, scarlet fever, and enteric fever. These are all infective agents which are apt to be found in and spread by milk, and to that extent even imperfect pasteurisation is a certain degree of protection. These diseases are, however, dependent upon organisms which are not normally present in milk at all; in other words, the milk which does contain them has usually been contaminated by people who handle the milk carrying these organisms. Far more important than any of these, in the opinion of the present writer, is the bacillus of bovine tuberculosis, which is, unfortunately, all too common in cow's milk, and which is responsible for so many cases of glandular and bone disease in human children. This organism is not so easily killed. According to the observations of Délépine upon the temperature required to destroy the tubercle bacillus in milk, it is very doubtful whether any temperature short of boiling-point can be regarded as safe for this purpose. In other words, in order to safeguard the infant population from the risk of infection from tuberculous milk, two courses only are open. The first is absolutely to sterilise the milk supplied to infants, and the second is to separate the infant milk supply from that of the rest of the community, and to see that it comes from only tubercle-free herds. That assumes that the entire elimination of tuberculosis from the cows of the country is not a matter of practical politics for the moment, though it is to be hoped it will eventually be an accomplished fact.

Returning for a moment to the process of pasteurisation, it should be mentioned that the ineffectual process in which the milk is exposed only for a moment or two to the highest temperature is known as the *flash* process. In this the milk has a continuous flow through the machine, and is only subjected to the temperature reached for a period as a rule not exceeding a minute. In the second process a given bulk of milk, generally some hundreds of gallons, is heated to the required temperature, and kept there for a much longer period, from twenty to thirty minutes or so, according to the actual temperature reached.

In any future milk legislation the subject of pasteurisation demands a special place. The term itself must be defined in law, so that the public may know what pasteurised milk is, and what it is not. This necessity has already been recognised in America, where pasteurisation is extensively carried out, and the Department of Health of the City of New York, in their Regulations of April 1912, define pasteurisation in the following way: "Only such milk or cream shall be regarded as pasteurised as has been subjected to a process in which the temperature and exposure conform to one of the following:—

"No less than 158° F. for at least 3 minutes.
" " 155° F. " " 5 minutes.
" " 152° F. " " 10 minutes.
" " 148° F. " " 15 minutes.
" " 145° F. " " 18 minutes.
" " 140° F. " " 20 minutes."

The New York legislations also demand that "the milk after pasteurisation must be at once cooled and placed in clean containers, and the containers immediately closed."

This is an example of what is meant by a legal definition of pasteurisation, which is urgently needed in this country. Without definitely committing oneself to these figures, the suggestion is that the process should be legally defined, and that any such definition should take into account the temperature employed, and the period of time to which the milk is exposed to that temperature.

It has been said that pasteurisation has a certain commercial value, and also a distinct value from the point of view of public health. At the same time, the present writer wishes to place on record his own view, that the pasteurisation of milk is not an ideal to be aimed at. Even at its best, it is a curative of evils which ought not to exist. Its justification is the fact that in a great many sources of supply the milk is dirty, contaminated, and possibly contains infection. A perfect milk supply should have none of these faults. On this subject they have a saying in Denmark which hits the nail exactly on the head, and that is: "He who pasteurises bad milk is a rogue; while he who pasteurises good milk is a fool." In other words, if proper care is taken at the source of production to see that the cows are free from disease, that the milkers are clean and healthy, that the utensils are carefully sterilised, that the methods of handling prevent impurities reaching the milk, that the methods of transit are satisfactory, and, lastly, that the methods of distribution are good, then there should be no need for pasteurisation. It may be said that this is an ideal which it is impossible to attain, but the fact remains that there are a certain number of producers to whom all these conditions apply. There ought to be many more. It ought not to be beyond the resources of the Milk Industry to see that all milk is produced from healthy cows by healthy milkers, cleanly handled, cooled at once, and delivered in that condition. This is not a question of the outlay of vast sums of money at all. It does not mean costly buildings or anything of that sort. It simply means instruction of those concerned, and careful attention to a few simple rules of hygiene. The present writer is very definitely of the opinion that producers of milk ought not to expect any extra payment for producing clean milk and keeping it clean. It should be the business of the public-health authorities to compel them to do this, and any milk producer, handler, or vendor who will not adopt hygienic methods ought not to be allowed to sell milk to the public. The one thing that the producer of milk has a right to expect extra payment for is the superiority of his milk from the point of view of its food value. As a commercial article milk containing a high percentage of butter fat is worth more, and should be paid for at a higher price, than milk of low fat content.

Until, however, we get a wider application of hygienic principles in milk production and distribution, with adequate supervision by the public-health authorities, it will be necessary to continue the pasteurisation of milk in our densely-populated communities.

Finally, in connection with pasteurisation, one should like to refer to the Report of the National Commission on Milk Standards of the New York Milk Committee, 1920, a Committee which is still continuing its investigations. This Committee made a recommendation on 16th February 1917, which read as follows:—

"(*a*) That pasteurisation of milk should be between the limits of 140° F. and 155° F. At 140° F. the minimum exposure should be 20 minutes. For every degree above 140° F., the time may be reduced by 1 minute. In no case should the exposure be for less than 5 minutes.

"(*b*) In order to allow a margin of safety under commercial conditions, the commission recommends that the minimum temperature during the period of holding should be made 145° F., and the holding time 30 minutes."

Since that time the Committee has had experience in the pasteurisation of milk by using the time and temperature above mentioned, and they are of opinion that this experience has in every way justified the conclusion they have come to. They therefore wish to confirm their original report on this subject by stating that as far as they are aware there is no reason why their recommendation, originally made regarding the proper time and temperature for the pasteurisation of milk, should be changed. Under these circumstances, it may be taken for granted that this is the last word upon the subject up to the present date.

THE TUBERCULIN TEST FOR CATTLE.

The well-known and fully-admitted prevalence of tuberculosis in cows makes the subject of the tuberculin test of great importance in considering problems of the modern Milk Industry. It is necessary, therefore, that some little attention should be paid to this matter.

In the first place, attention should be directed to the inquiry and findings of the Astor Committee in this connection. This Committee appointed a special Sub-Committee of its number whose terms of reference were "to suggest (as regards bovine tuberculosis) details by means of which a system of accredited herds can be established without unduly diminishing the production of milk." (Page 30, Final Report, Astor Committee.) It so happens that the present writer was the chairman of that Sub-Committee. They took into account the fact that the dairy herds of the country contained a large number of cows which react to the tuberculin test. They considered that until recently farmers failed to recognise the advantage of eliminating reacting cattle, unless they happened to be engaged in the sale of pedigree breeding stock. They were also of opinion that there was a lack of knowledge on the part of farmers of the comparatively simple methods which required to be followed in order to obtain and preserve a herd free from tuberculosis, and, further, that farmers hardly realised the economic advantages which would follow such a procedure. The Committee further noted the important fact that there exists a considerable lack of uniformity of system in the method of application and in the interpretation of the tuberculin test as at present practised. They were much impressed also with the fact that up to the present date there is no legal control of any kind in the use of tuberculin. They noted with regret that no serious attempt has been made by any Government to help the agricultural community to eliminate tuberculosis from the dairy cattle of the country.

While, however, these considerations were impressed upon their minds, they also felt that the situation was gradually undergoing alteration, and they were of opinion that the future would show an increased demand on the part of the public for tubercle-free milk, even if that involved a higher price. In that connection it was remembered that the Milk and Dairies (Scotland) Act contained various provisions which would assist in this direction. The Committee then put forward a very simple scheme as a solution to the problem which had been remitted to them. This scheme presupposed that there should be provided official veterinary assistance by the State in diagnosis and eradication of tuberculosis; that certificates should be granted to the owners of those herds in which certain conditions had been complied with; and that a system of milk grading, which would provide an official guarantee upon which the producer could claim a better price for a better article, would be welcomed by the most up-to-date producers, and would help very much to eradicate tuberculosis. It was quite clearly realised that any such system would work perhaps slowly just at first, but it was also thought that as the numbers of young stock in clean herds increased, and therefore became abundant, the scheme would develop with increasing rapidity.

Having all these considerations in their minds, this Sub-Committee submitted the following scheme as a basis for the introduction of the accredited herd, or tubercle-free herd system :—

"(1) The manufacture, the distribution, and the use of tuberculin to be controlled by a central authority.

"(2) The method adopted in the carrying out and the interpretation of the tuberculin test to be standardised.

"(3) Facilities to be provided out of public funds for free tuberculin testing, provided that the farmer can supply satisfactory evidence that he has reasonable facilities for carrying out these tests, and is willing to comply with the necessary conditions laid down for freeing his herd. Such a herd should be recognised as tubercle-free, and a certificate given to the effect that the herd was tested on a particular date and found free, and will be subject to retesting periodically."

In putting forward this solution the Committee had in view the provision of the Milk and Dairies (Scotland) Act which requires the appointment of veterinary officers, whom they thought would be the proper people to do this work. They also laid stress upon the universal adoption of the Tuberculosis Order, which is at present in abeyance, as a valuable aid. Finally, they mentioned that there was no doubt that primary abdominal tuberculosis, as well as tuberculosis of the neck glands, is commonly due to ingestion of tuberculous infective material, and that a considerable amount of tuberculosis in childhood arises from infection from cow's milk. Whatever the exact amount of this human infection may be, they said, it is a preventable infection, and as such calls for every effort to be made to deal with it.

This Report of the Sub-Committee was presented, and adopted by the full Astor Committee.

It will thus be observed that, in the opinion of those engaged in this inquiry, the first essential point in the use of tuberculin is that it should be manufactured, distributed, and used under Government control, and that, indeed, seems to us to be an essential primary step. At the present moment there is absolutely no restriction whatever on the manufacture, distribution, and use of this preparation. It is open to any one to make and sell on the open market any preparation called tuberculin, which may or may not be a reliable agent for the purpose for which it is intended. As a matter of fact, of course, it is well known that some preparations of tuberculin are much more reliable than others. The mere fact, however, that there are a number of such preparations on the market, manufactured by different firms or laboratories, is the primary cause of whatever dissatisfaction and distrust exists in the application of the tuberculin test. Cases are not infrequent —several have come to the writer's notice during the past year—in which a herd, having been tested by one brand of tuberculin, have all passed the test, and been certified as tubercle-free. The same herd, after the expiry of some months, on being retested with another brand of tuberculin, has shown a considerable proportion of reacting animals. The owner of the herd to-day can demand from the veterinary surgeon that such and such tuberculin shall be used, or the veterinary surgeon, if it be left to his judgment, can select any kind of tuberculin he fancies with which to make the test. Under these ridiculous circumstances, it is quite impossible, of course, to get any reliable or uniform results. It becomes necessary in every case to inquire what particular tuberculin is used, and to compare the results obtained with others which have been obtained with other tuberculins. There is no necessity to labour the point. It is quite obvious that before any reliable results can be obtained the law must demand a definite kind of tuberculin, manufactured under central control, sold only to qualified persons, who alone should be allowed to use it. Then, and then only, will it be possible to interpret the results of the test in a manner which will give confidence and security to all concerned. So long as the preparation of tuberculin, its concentration, and its dose remain unstandardised and the sale unrestricted, so long will there certainly be a divergence in the results obtained from its administration, producing a feeling of uncertainty and insecurity which reflects upon the whole test. This is the more to be regretted, because there is no doubt whatsoever that tuberculin is a most reliable agent when properly prepared and administered by the hands of qualified persons.

The present writer has had this subject forcibly brought under his notice in connection with the granting of licences for special qualities of milk issued by the Ministry of Food and administered by the Scottish Board of Health. Two such forms of licences are at present in existence—namely, those which permit the use of the designation "Grade A (Certified) Milk" and "Grade A Milk," and a certain number of producers in Scotland hold these licences. Both these grades of milk require that the milk shall be produced under specially clean and hygienic conditions from a herd free from tuberculosis. It therefore follows, of course, that any milk producer applying for one or other of these licences is compelled to submit his cows to the tuberculin test, which has to be carried out according to certain definite regulations. There is no power, however, to insist upon any special kind of tuberculin being used, and the experience gained in administering these licences has shown what a serious drawback that is. This led Mr R. Simpson, F.R.C.V.S., D.V.S.M., who has been inspecting these herds on behalf of the Scottish Board of Health, to pay special attention to the matter under discussion, and he has forwarded to the present writer some observations which are of considerable value, and which are now quoted in his own words.

"There are various methods of applying tuberculin for the purposes of diagnosing tuberculosis. The method which is most used in practice, and which has so far proved to be the most reliable, consists in the injection of a subcutaneous dose of tuberculin and the recording of the temperature following injection. Whilst this method is considered to be most reliable, it would be wrong to claim that the method is infallible in detecting tuberculosis. Under proper conditions of application and surroundings, it may be considered safe to say that practically all definite and typical positive reactions may be looked upon as definite evidence of the presence of tuberculosis. Certain infected animals, however, do fail to respond to the subcutaneous injection of tuberculin, and such cases may be considered under four headings:—

"(1) Animals in the incubative stage of tuberculosis. This period of the disease, during which no reaction may be got, varies from 14 days up to two months. Such animals would, however, be detected in a subsequent test, as is provided for by the Regulations, which require retests at intervals until the herd is clear.

"(2) Animals which have ceased to react to tuberculin, although suffering from tuberculosis. Such cases are not uncommon where a tubercular lesion exists in some lymphatic gland 'shut off' from the rest of the system—a lesion, however, which is liable to cause the animal to suffer from a recrudescence of the disease, when the animal becomes a reactor to tuberculin.

"(3) Animals which are in the last stages of tuberculosis, where clinical symptoms of tuberculosis are in evidence. In such cases, it occasionally happens that no reaction is obtained to a subcutaneous dose of tuberculin.

"(4) Animals which have previously received a dose of tuberculin.

"The interval which elapses before a second thermal reaction may be obtained is usually put at 30 days. There is, however, some evidence to show that certain animals retain their tolerance for tuberculin for a longer period, and it is customary to attempt to surmount this difficulty by injecting a double dose of tuberculin, and by recording the temperature two hours subsequent to the test and every hour onwards.

"Where there is a suspicion of a previously-injected dose of tuberculin to contend with, it is generally advisable to associate with the subcutaneous test one or other of the local subsidiary tests.

"The value of the subcutaneous test is based on the thermal reaction which follows the injection of a proper dose of tuberculin into tuberculous subjects.

"For the proper interpretation of the test it is essential to know :—

"(*a*) the limits of normal temperature variation in healthy animals ;

"(*b*) what constitutes a positive thermal reaction.

"In regard to (*a*) this is a point which is of very great importance. It must be recognised that even healthy animals, and particularly young animals, are subject to appreciable variations of temperature, the cause of which it is difficult to determine. It is no uncommon thing to find young bovine animals with an apparently normal temperature of 102° F. to 103° F. Further, during pregnancy a temperature of 103° F. or even more is physiological and consistent with normality.

"Intensive feeding, movement, and new surroundings also tend to raise the temperature.

"It follows, therefore, that these are factors which must be taken into consideration in applying the test. Animals, of course, with a high temperature are unsuitable for testing by the subcutaneous method. Settled normal conditions and surroundings are an essential preliminary to subcutaneous tuberculin testing.

"To bring animals in, for instance, from pasture into strange surroundings and then commence to test would be merely to run a considerable risk of obtaining fallacious results.

"In dealing, therefore, with the standardisation of the method of subcutaneous testing a preliminary period of settled conditions is a *sine quâ non.*

"(*b*) With regard to what may be considered as the critical temperature in indicating a positive reaction, it will be obvious that there is a great deal of difficulty in laying down hard and fast rules of interpretation.

"There are two possible errors in deciding upon a critical temperature:—

"(1) that of condemning a non-tubercular animal; or

"(2) that of allowing a tubercular animal to escape detection.

"The decision as to what is the critical temperature will depend on the relative importance which is attached to either of these errors.

"If the critical temperature fixed upon is too low, the first error may be committed; if the critical temperature fixed upon is too high, tubercular animals may escape detection.

"There is also a further possible source of error in that an animal may undergo an elevation of temperature during the tests from causes entirely unconnected with the injection of tuberculin, causes such as nervous excitement, temporary sickness, unaccustomed handling, and strange housing.

"It has been amply proved that non-tuberculous animals do not give a thermal reaction even to large doses of tuberculin, and if one could exclude any accidental elevation or disturbance of temperature, even a rise of 1° F. above the pre-injection temperature might be considered a reaction.

"In other words, the interpretation of the test has to be made on the assumption that there would have been no appreciable rise of temperature if the animal had not been tested. The instructions issued with the tuberculin manufactured at the London Veterinary College state that a positive reaction consists in a gradual rise of temperature from normal (between 101° F. and 102° F.) to 104° F. or over, a doubtful reaction consisting in a rise from normal to between 103° F. to 104° F., a negative reaction being where there is no elevation of temperature above 103° F.' In interpreting any reaction it is very important to note the curve of the temperature. In a typical reaction there is a gradual rise and fall of temperature.

"A sudden rise of temperature followed by a sudden fall is by no means typical. While in the large proportion of cases tubercular animals will give a reaction conforming to the above lines, there is nevertheless a proportion of cases which require to be dealt with each on its own merits. In such cases indefinite reactions are got test after test, and it is a difficult matter to decide whether the animal is tubercular or not. In cases of this type the previous history, whether the animal has come from an infected herd or from a tubercular-free herd, is often a deciding factor, but it is precisely in such instances that it is so difficult to lay down hard and fast rules. Animals occasionally also may be got to react at one test and pass at a succeeding test. It is attempted to explain such cases by the possibility of an active lesion becoming encapsuled or shut off. Probably this may account for some 'intermittent' reactors, but not for all.

"To sum up, settled conditions, a normal temperature, fresh reliable tuberculin, proper dosage, injection in the proper manner, are desirable and even essential preliminaries to a subcutaneous tuberculin test. Under such conditions a gradual rise of temperature from normal to 104° F. during the 24 hours subsequent to injection, followed by a gradual fall to normal, may for all practical purposes be accepted as definite evidence of the presence of tuberculosis in the animal tested.

"The subcutaneous test, as has been indicated, is the principal and most reliable method of testing with tuberculin. There are, however, one or two supplementary tests which, although not very reliable in themselves, are, nevertheless, valuable aids to diagnosis. The Regulations lay down that the ophthalmic test shall be employed in addition to the subcutaneous test. Reference has already been made to the desirability of securing uniformity of application of the two tests.

"For the ophthalmic test specially-prepared tuberculin is required. This tuberculin is concentrated and free from any irritant. The method of application consists in the instilling of not less than 4 drops of ophthalmic tuberculin into the conjunctival sac, the other eye being left untreated as a control. In a tuberculous animal a positive reaction is indicated by congestion of the conjunctival vessels, lachrymation, congestion of the sclerotic, and a muco-purulent discharge from the inner canthus. The symptoms have been given in the order of importance.

"No animal, however, should be considered to have reacted to the eye test which does not show appreciable evidence of a muco-purulent discharge from the treated eye, the other eye remaining normal.

"There is the possibility that the other symptoms may be produced mechanically in non-tubercular subjects, particularly of a young nervous type, the small amount of interference with the eye in the application of the test being sufficient occasionally to make them rub the treated eye against the trough or partition, and so produce local irritation of a non-specific character. In most positive reactions there is a profuse yellow muco-purulent discharge which is diagnostic.

"The alleged disadvantages of the ophthalmic test are:—

"(1) *Unreliability.*—The percentage reliability of the test is variously put at from 50 per cent to 85 per cent of tubercular animals tested. In other words, if 100 tubercular animals are treated by this method, from 15 to 50 may give no reaction. The test appears to be more reliable in older animals, and if animals under 1 year or 18 months are excluded, the percentage reliability is raised. In the average dairy herd the percentage reliability would be somewhere between the two percentages given above, where the muco-purulent discharge is considered requisite to constitute a positive reaction.

"(2) *Difficulty of interpretation.*—It is often averred that it is difficult to assess what amount of congestion, of lachrymation and of muco-purulent discharge shall constitute a positive reaction. This difficulty is disposed of if a reaction is only considered to be positive when there is an appreciable amount of muco-purulent discharge. Opinion has already been expressed that this should constitute the essential symptom in deciding whether the reaction is positive or not.

"(3) *Effect on the subcutaneous test when simultaneously applied.*—It has been alleged that the mere application of the eye test to young excitable animals, with the accompanying handling, is sufficient to effect an appreciable rise of temperature, and thus interfere with the subcutaneous test. Experience, however, does not bear this out, and any possible elevation of temperature due to this cause is negligible.

"The advantages of the test are:—

"(1) Its simplicity. After the test has been applied, subsequent inspection of the results of the test can be carried out concurrently with the recording of temperatures for the subcutaneous test, and with a minimum of handling and trouble;

"(2) That the test can be repeated in a few days' time and a repetition of a positive reaction looked for. In other words, an animal does not acquire tolerance for the ophthalmic test as for the subcutaneous test;

"(3) That it can be applied even if the temperature is abnormal or when the animal has been subjected to unsettled conditions;

"(4) That it produces no constitutional or systematic disturbance, the milk secretion and temperature remaining unaffected, and there is no pain on manipulation in positive reactions;

"(5) That a previous subcutaneous dose of tuberculin does not interfere with a positive reaction being obtained in a tubercular animal. This advantage is of considerable importance, as it constitutes a certain amount of protection against fraud.

"As was previously pointed out, so long as the sale of tuberculin remains unrestricted and it is obtainable by any person, there will always be the possibility of obtaining completely false results from the subcutaneous test alone. Unfortunately, owing to the unreliability of the ophthalmic test, it does not by any means supply a complete protection against the possibility of fraud.

"The remaining supplementary test to be dealt with is the intradermal test. This test consists in the injection of a small quantity of concentrated tuberculin directly into the thickness of the skin, usually into the caudal fold. A positive reaction is indicated by a localised cellular infiltration and thickening of the skin at the seat of injection, reaching its height at or about the third day.

"The evidence is to the effect that this test is more reliable than the ophthalmic test, but suffers the disadvantage of being interfered with by a previous dose of tuberculin subcutaneously. It can, however, be applied to all classes of animals under any circumstances whatever. As a means of checking doubtful reactions to the other two tests, the intradermal test is of considerable value, but the interval between a subcutaneous test and an intradermal test should be as long as possible, certainly over a month.

"Usually the results of the intradermal tests are either frankly positive or frankly negative, but occasionally it gives doubtful results.

"There is, finally, the question of the possibility of divergent or conflicting results being obtained from these tests, and particularly from the subcutaneous and ophthalmic tests. As has been pointed out, reactors to the subcutaneous test may give no reaction to the ophthalmic test. In such a case it is almost unnecessary to point out that the subcutaneous reaction, if positive and typically so, must be accepted as conclusive evidence of the presence of tuberculosis.

"On the other hand, there is the possibility of a positive ophthalmic reaction being obtained (1) where there is no simultaneous subcutaneous reaction, owing to failure on the part of the subcutaneous test due to reasons previously outlined; or (2) where a doubtful reaction is shown to the subcutaneous test. In such instances if the ophthalmic reaction is undoubtedly and typically positive, the animal should be rigidly excluded from the herd, in spite of the fact that no reaction, or a doubtful reaction, is obtained from the subcutaneous test. In freeing herds of tuberculosis not only are divergent results to be looked for from different methods of testing, but also from the same method of testing.

"It occasionally happens that certain animals in tubercle-free farms pass several successive subcutaneous tests, and then suddenly react. If tested later, after a proper interval, some of these animals may give a negative result to a subcutaneous test. If, however, the single positive reaction obtained in such animals is typical and definite, such animals should be excluded from the herd, the positive reaction being more important than the negative one following."

The present writer only wishes to add in this connection that he is in complete agreement with Mr Simpson's views as expressed in this communication, which in his opinion deserve most careful consideration.

Education and Propaganda.

It is sometimes said that a country gets the kind of Government that it deserves. It might almost be said with equal truth that consumers get the kind of milk they deserve, in the sense that if they do not take sufficient interest in the Milk Industry as a whole, those concerned in it will take correspondingly little trouble. Fortunately there are many signs encouraging us to believe that the general public are at last gradually becoming alive to the importance of the milk question. We believe that the last three or four years have shown a very definite increase in the interest and attention of the nation to this question. It is therefore all the more important that every effort should be made by means of education and propaganda to produce a really active and healthy public opinion on questions of milk which would make itself felt through the administrative action of Local Authorities and Central Departments. One should like to see the Public Health Committee of every Local Authority making themselves responsible for a serious endeavour to spread knowledge and information on the various aspects of the milk question amongst the people whom they represent. A very great deal of good might quickly be done in this manner. Here, as elsewhere, it is chiefly ignorance and indifference which stands in the way of progress. Lectures and exhibitions dealing with various phases of milk production and distribution ought to be organised and frequently given all over the country. As it is, they are comparatively rare. One such exhibition was held in Philadelphia in 1911, which was open free to the public for eight days, and was visited by no less than 110,000 people. It is at once obvious that an exhibition of that kind must have a tremendous effect upon the community, which would soon be reflected in their demand for cleaner methods, and so forth. The National Clean Milk Society of London is doing splendid work in this connection, but has not received anything like the support which the importance of the subject demands. There is room, too, for great extension of education for those who are really engaged in the industry itself. Excellent work is done in Scotland in this matter by county organisers and instructors, and courses of instruction in dairying are given at three Agricultural Colleges. We understand, however, that these do not provide for all the demands made upon them. The one Dairy School for Scotland—namely, that at Kilmarnock—can hardly be regarded as sufficient to meet the needs of all who require instruction, and one would like to see its operations extended to a much larger scale.

MILK PRODUCTION AND THE KEEPING OF GOATS.

The last problem to which it is desired to devote a little attention is one which, though of great importance, has received comparatively little consideration in this country. We refer to the necessity for the adequate provision of milk for the children and families of those living in scattered and remote rural districts where there is no organised supply and distribution of milk. The dweller in the city, when he dreams of life in a remote country district, almost invariably assumes that one of its advantages is that of a land flowing with milk —if not honey. It is only those who have lived or worked in such localities who thoroughly realise how far this is from being the fact. The country medical practitioner will tell you that one of the greatest difficulties he has to contend with is the fact that his poorer patients, the cottagers, labourers of different kinds, and so forth, have great trouble in securing milk for their children or themselves. A cottager in such places cannot afford to keep a cow, and if he could, his milk supply would be in excess at one period and absent at another. The milk from the farms surrounding him is too often all required for other purposes. It is collected by motor lorries for the supply of wholesale dealers, and there is no surplus over to meet the demands of the scattered residents in lonely places. Unfortunately this absence of an adequate milk supply in country districts is by no means a rare thing. In fact it is extremely common. It is only in towns that one can be sure of getting milk all the year round.

One of the questions considered by the Astor Committee was that of providing milk for the special needs of children under such conditions. The importance of the goat as a substitute for the cow in this connection was brought before that Committee by the present writer, who was appointed Chairman of a Sub-Committee to report upon the subject of goats as a factor in the milk supply. The recommendations of that Sub-Committee will be mentioned in a moment. In the first place, however, it is interesting and important to realise that Great Britain alone among the countries of the world has neglected the goat to an extraordinary extent. Probably the total number of goats in this country to-day, which are of any use from the point of view of supplying milk, is not much more than a thousand. There are far more in Ireland, where many thousands will be found kept by the peasants. But one has to go to other parts of the world to find the goat really appreciated. In 1903 the number in America was just on 2,000,000. Mr Pegler gives the following numbers for some European countries: France, 1,794,837; Russia, 1,700,000; Austria, 979,104; Spain, 4,531,228; Italy, 1,690,478; and he estimates the grand total for Continental Europe at 17,198,583. South America is estimated to have 5,662,239; Africa, 17,557,990; Asia, 40,557,402. Without pinning our faith to the accuracy of these exact numbers, they are sufficient for our present purpose, which is to show that the rest of the world has long ago realised that the goat is a most valuable animal, in fact an invaluable animal, in connection with the milk supply of the country. They are among the oldest of the domestic animals, and have contributed to the subsistence of mankind as far as all historical evidence is available.

It is no part of our present purpose to discuss the different breeds of goats and their respective qualities. Our immediate point is to emphasise the value of the milch goat in rural districts for its milk-producing qualities. In Switzerland the goat is called "the poor man's cow," because goats are cheap and supply the poorer classes with milk under conditions which render the keeping of cows an impossibility. In those mountainous regions three or four milking goats of good quality are considered to be about equal in milk production to an average cow, and two or three goats will provide a steady supply of milk all the year round, which a single cow does not. Moreover, they are much more easy to feed, and require very little artificial food. In addition, they have the great advantage of being strong, healthy, and robust, and very rarely affected with tuberculosis. The quality of their milk, from the fat percentage point of view, varies considerably with the breed, but the average is usually regarded as being about 3·4 per cent. The milk also makes excellent cheese, while the flesh of the young animals is regarded in most European countries as a delicacy. The skins, of course, provide the raw material for the manufacture of fine leather, such as kid and morocco.

Having all these facts, and many others, in mind, the Astor Sub-Committee on Goats drew attention to the fact that the supply in this country was far below the demand, and that the quality of the local goats was usually deplorably low. The shortage of good pedigree stock makes the price of a good goat almost prohibitive. There is, however, a great urgency to increase the supply of good pedigree goats as soon as possible, especially by the importation of new blood into the country. The Committee specifically recommended that the Government should undertake the establishment of several stud farms for good pedigree goats, placing these farms at two or three centres in England and Scotland. These farms should have as their primary object the breeding of pedigree male goats for stud purposes. They also advised the formation of local Goat Clubs throughout the country, to encourage improvement in the feeding and management of goats, and for the placing of stud goats in suitable centres. These stud goats might be maintained at the central farms, from which they could be sent to local centres during the breeding period, which is from September to February. Such a simple scheme would cost a very small amount of money indeed, but the result in a few years would be the solution of a very difficult problem. The only difficulty in connection with it is the question of the importation of live goats into this country, which is contrary to the present Regulations. That difficulty could, of course, be overcome by a stroke of the pen on the part of the Ministry of Agriculture, who could lay down whatever conditions they chose as to quarantine and so forth, so as to ensure prevention of the introduction of disease. There are plenty of islands off the coast of Scotland which might well be utilised for such a valuable national purpose. It only remains to be added in this connection that the Astor Committee approved of the scheme suggested by the Sub-Committee, and it was forwarded to the Government Departments concerned.

CONCLUSION.

In the foregoing pages reference has been made to a number of problems which present themselves in connection with the modern Milk Industry; and there are a number of others of almost equal importance which might have been dealt with if space permitted. In concluding this survey of the situation, so far as it goes, let us just emphasise what appears to be the most urgent aspect of the situation. One would place in the forefront of milk reforms the need for reviewing from an entirely new standpoint the whole mass of legislation which governs the production, distribution, and sale of milk, with a view to placing all this under one single Milk Act, which should take into consideration every aspect of the case. That seems to the writer to be the most fundamental and important matter for the future welfare of the milk supply. Failing that, the putting into operation of the Milk and Dairies (Scotland) Act, either with or without an Amending Bill, would materially assist the situation, especially if this were accompanied by the reinforcement of the Tuberculosis Order. The Milk and Dairies Act will at any rate give the Central Authorities and Local Authorities considerable additional powers for dealing with the milk supply from the hygienic point of view. It will also enable the process of pasteurisation to be controlled and put upon a sound legal footing. It would probably provide for an introduction of the system of grading milk according to quality. It would not, however, change the existing law as to standards, nor assist in getting rid of the anomalies which at present exist in connection with sampling and certain prosecutions. There is, however, considerable hope that all these matters will receive attention before many years are passed, because there is no doubt that the question of the milk supply is gradually being forced upon the attention of the public, who, when they are sufficiently educated on the points involved, and when they realise all that it means for the welfare of the nation, will assuredly demand a more scientific system of conducting the business, as well as of administering the laws which control it.

EGG-LAYING COMPETITIONS.

THEIR RELATION TO THE INDUSTRY OF EGG-PRODUCTION.

By H E IVATTS, late Hon. Secretary, Utility Poultry Club.

To appreciate adequately the purpose and use of egg-laying competitions, and the effect such can have upon the national production of eggs, necessarily requires an appreciation of the enormous quantity and value which such production amounts to annually, as also the consequent appreciation of the great national importance of the industry responsible for this production. That the recognition of such is generally lacking, even among agriculturists, is commonly admitted, and is evidenced by the fact of our long-continued and considerable dependence upon eggs imported from foreign countries. Indeed, for very many years the development of our home production has been inadequate, both as regards the total number of our national poultry stock and the average productive yield obtained from it. That such a position exists is largely due to there being no statistics bearing upon the home industry, and also to the fact that our producers of eggs are not only extremely numerous, but varying in class, embracing as they do almost every section of the community, and further, that the average annual contribution of each to the national requirement is comparatively small, both as regards quantity and value. The old adage "many a mickle makes a muckle" can certainly be very appropriately applied to the poultry industry. It is, indeed, largely due to such circumstances that the task of reform and the development of an increased production has been rendered so difficult.

As egg-laying competitions can fulfil a function beneficial to the poultry stock of the general farmer, to whom this article is mainly addressed, our purpose may, perhaps, be more fully attained if a broad estimate is given as to the extent and value of the poultry industry. As indicated, there are no statistics in respect to the home industry; indeed, as will be easily appreciated, to determine the national head of stock, its annual production, and the total number of eggs consumed and used for industrial purposes would be impossible. Our only available records relate to the number and value of eggs and dead poultry imported from foreign countries. Those for 1913, as taken from the Board of Trade returns, are given below, and they will be an aid, in great measure, in providing an approximate estimate of our entire requirement of eggs which follows.

IMPORT TO THE UNITED KINGDOM, 1913.

	Quantity	Value
Eggs (all countries)	2,589,594,000	£9,590,602
Dead Poultry	13,928 tons	£955,238

Of the eggs, approximately 53 per cent were received from Russia; and taking our population at 45½ millions, the total represents 56 eggs per head.

With respect to our home industry we can only construct figures upon the basis of probability. It is, at least, known that 56 eggs per unit of population are imported. That the home production exceeds this number there can be very little doubt. Probably it would not be unduly estimated at 60 per cent of the total national requirement. If such can be accepted, it would contribute 86 eggs per head, thus making 142 eggs as the average annual requirement per head of population. On such an assumed basis, the following figures are determined :—

	Eggs	Per cent	Per head of population	Value, £
Imported (1913) . . .	2,589,594,000	40	56	9,590,602
Home production (1913) (estimated)	3,884,391,000	60	86	17,263,082[1]
	6,473,985,000	100	142	26,853,684

If the total number of eggs is converted into terms of poultry stock—allowing as low as 85 eggs as the general annual average production per bird, and increasing same by 5 per cent for male birds—the immensity of the industry is emphasised :—

Imported eggs the product of . . .	31,989,101	head of stock
Home produced " " . . .	47,983,652	" "
Total	79,972,753	

The annual food consumption per adult bird may be taken at 84 lbs., consisting of approximately equal parts of grain and meals. Thus our national stock of poultry consumes, annually, approximately 1,799,386 tons of feeding-stuffs.

The above figures are, indeed, of much significance, and it must be granted are of considerable importance in relation to the general national economy. Such, briefly, is the approximate position; and it will be realised that this enormous egg requirement has, in the main, rested upon a very considerable number of comparatively small and diverse producers whose production, in many cases, is of casual origin. Consequently the home supply of eggs has always been wholly inadequate to meet the ever-increasing consumption demand, and hence the opportunity of the foreign importer.

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[1] Value estimated at 20 per cent above that of imported eggs.

To a great extent, farm poultry-keeping has existed upon a casual basis. Not being considered as a specific branch of the farm undertaking, it has remained as a small side-line only; and, with but few exceptions, the farming community as a whole have never considered the income derivable from the sale of eggs as other than of trivial consequence, nor have they sufficiently appreciated that it could be otherwise. However, the increased value of eggs, consequent on war conditions, and the very considerable reduction of supplies from abroad has, to some extent, affected the farmer's views as to the economic possibilities of poultry stock. Certainly a great opening now awaits the farmer with a little enterprise and a moderate outlay of capital.

Egg-laying competitions are but little understood by farmers, although the other egg producers, from the home poultry-keeper with but six birds to the commercial egg-farmer carrying 5000 head of stock, have long appreciated their purpose and value. As a result the productiveness of their flocks has been considerably increased. In addition, many pedigree utility poultry-stock breeding establishments have been created as a direct consequence of these competitions. They have exerted an influence upon the stock of the poultry-keeper similar to that which milk-recording is exerting upon the farmer's dairy herd. In each case it becomes a question of more attention being given to breeding, and the early identification and elimination of the uneconomic units. To some extent, though more generally in an indirect way, egg-laying competitions have influenced the farmer's poultry. With his present increased opportunities, it is desirable that he should become more familiar with these institutions, and it is certainly desirable that in future competitions a section should be provided solely for farmers.

To consider fully the reasons why the numbers of farm poultry, and their productive yield, have not advanced to an extent proportionate to that of other producers would be beyond the scope of this paper. However, it may help to emphasise the value of egg-laying competitions if a few points in this connection are briefly referred to. Other classes of poultry-keepers, whether their operations be on a small or on a considerable scale, are, in an economic sense, to a greater or less extent, definitely dependent upon the market produce obtained — the more so, indeed, having regard to their less favourable opportunities as to land, buildings, and homestead. Hence their greater knowledge and efficiency in this branch of agriculture. On the other hand, poultry-keeping on the general farm is seldom undertaken upon an efficiently organised basis, or upon a scale appropriate to the full capacity of one employee. The qualified, or efficient, poultryman has no established position on a farm such as that of the ploughman, stockman, &c.; in fact, in such a sense he does not exist. That his introduction could, on economic grounds, be justified, and that such would in a comparatively short time result in our production of eggs being equal to the total national requirement, there can be but little room to doubt. Indeed, were the productive yield alone of farm poultry increased by 20 per cent, a considerable diminution in the number of imported eggs would be effected. Therefore, the number of head of poultry maintained by farmers generally has had but little relationship to their opportunities, and the productive yield per unit has been less than that of other producers. Nevertheless it may be generally assumed that, of the total home production, the farmer's eggs constitute the greater proportion; and though his production per unit may be the lowest, his gain per dozen probably equals that of the higher producer, as a consequence of his superior economic opportunities. As the laying competitions have raised the stock of our breeders of selectively-bred utility poultry to a position of world pre-eminence, equivalent to that of our farmers for all other farm stock, so can they affect the farmer's poultry. Indeed, some farmers have benefited in this connection, and now give the same serious thought and consideration to the conduct of their poultry operations, both as to breeding and maintenance, as that given to other farm stock.

The present advanced position of the poultry industry, and more especially that of the breeders of selectively-bred laying stock, may justly be attributed to the work undertaken by the Utility Poultry Club, now existing as the National Utility Poultry Society, and the Northern Utility Poultry Society of Burnley, Lancashire. These societies were responsible for organising the first public laying competitions.

On the formation of the Utility Poultry Club in 1896, Mr H. Holmes-Tarn, one of its founders, conceived the idea of proving the value of laying strains of poultry and creating enthusiasm among poultry-keepers by means of egg-laying competitions. The first competition, which was held by the club in 1897 at Northallerton, under the management of Mr Simon Hunter, may be said to have given the initial impetus to utility poultry-keeping, as distinct from the breeding of exhibition or show poultry, and upon it all subsequent egg-laying competitions in this and other countries have been modelled.

Since 1897 egg-laying competitions have been held annually by either or both of the societies mentioned, and more recently by the Department of Agriculture and Technical Instruction for Ireland at the Munster Institute, Cork ; the Harper Adams Agricultural College, Newport, Salop ; the South-Eastern Agricultural College, Wye, Kent ; and a few of the more recently-formed Utility Poultry Societies.

It will be unnecessary to consider fully the evolutionary progress in respect to the success and conduct of the early egg-laying competitions, or the many difficulties, incidental to all pioneer movements, over which enthusiastic effort usually prevailed. It will suffice to record that poultry-keepers in ever-increasing numbers readily responded to the encouragement offered, and that these competitions have become firmly established both here and abroad. Yet it is to be noted with regard to our own competitions that, with but few exceptions, entries from the general farmer have been conspicuously absent. In recent years the competitions have been variously termed as laying trials, laying tests, or contests. They are all, however, primarily competitions. Nevertheless so much data, of economic and educational value, is now recorded that this aspect must be considered as of, at least, equal importance to that of the granting of awards and consequent public identification of the breeders of high fecund strains of the various breeds of poultry. Thus egg-laying competitions possess a dual function.

It will be recollected that in past years the scarcity and consequent high prices of eggs during the winter months was a more common occurrence than is the case to-day, and farmers and other producers were urged to hatch out their pullets early in March. In view of this winter-egg problem, the earlier egg-laying competitions, up to that of 1911-12, were planned to commence in the month of October, and their duration was limited to the four winter months. Such was, indeed, a fortunate arrangement, for research and the records of competitions have since proved this to be the most important period of a pullet's production, as will later be shown by some tabulated results. That is to say that, providing hatching operations are conducted during the proper and normal period of spring, a low production during the following winter period will generally be indicative of a low total annual yield.

Egg-laying competitions have always been conducted under specific rules. In the earlier competitions the competitor's pen consisted of four pure-bred pullets of any breed hatched not earlier than the 1st of January preceding. Each pen was allotted a number, and each pullet was numbered with a metal leg-ring, the names of the competitors being suppressed until the competition concluded. On arrival at the competition plant each pen was accommodated in a small house with an attached grass run enclosed by wire-netting. Thus the egg-yield of each pen of four birds was recorded, and observations made as to moulting and broodiness of individual pullets. In the event of a bird dying, the owner was allowed to send another to replace it without penalty. Evidence of the laying of undersized eggs soon became apparent,'so that a rule was instituted under which such eggs were discounted by 10 per cent; and whilst continuing this penalty the pen yield of eggs was subsequently assessed for competitive purposes upon a money-value basis, in accordance with an average scale of values prepared from the weekly market returns for the previous year, as issued by the late Board of Agriculture and Fisheries.

A great advance in the value of the laying competitions, and a development of immense importance to utility poultry-keeping as an industry, occurred in 1902 through the introduction of the trap-nest, which enabled the egg-yield of each individual pullet to be recorded. Thus the fecund factor, from zero upwards, of each pullet, the number and persistency of small or undersized eggs and other inherited characteristics, were determined. As a consequence of the further experience gained, conditions and rules were adjusted. These changes had reference mainly to the following points: The permitting, or otherwise, of replacement birds for those which died either through accident or disease; the sending of one reserve pullet whose complete egg-production should be substituted for that of a pullet dying; the penalising of eggs weighing less than 2 ozs.; and the basis of assessing the value of the total pen eggs. Though some aspects of these problems have now been definitely decided, finality in other respects has yet to be obtained, and it must, with regret, be recorded that the rules of present-day egg-laying competitions vary to some extent.

Up to the period of 1911-12 the egg-laying competitions of the Utility Poultry Club were carried out at the poultry farms of members in various localities, and were, as already indicated, generally limited to the period of four winter months. At this period the value and importance of these competitions had so increased that efforts were made for their being undertaken upon a larger scale and for the full period of twelve months. With the assistance of grants-in-aid from the Development Fund Commissioners, the Club arranged for their laying competitions being carried out at the Harper

Adams Agricultural College, where they were continued until 1915-16. With the exception of that held during 1914-15, for ten months only, these competitions were conducted for the full period of twelve months, and each competitor's pen consisted of six pullets instead of four as formerly. The competitions of the Northern Utility Poultry Society were also similarly extended at this period, this Society providing the necessary additional plant at their small-holding at Burnley.

The ten-months' competition at the Harper Adams Agricultural College during 1914-15 is worthy of note, in that an important and desirable departure from former practice was initiated. In all former egg-laying competitions the awards were competed for by pens representing any pure breed of poultry. Although from time to time various breeds gained high awards, the White Wyandotte and White Leghorn breeds were more generally successful. Hence the efforts of poultry-breeders became more generally concentrated upon these breeds. In view of this development, and in view of the desirability of improving laying strains of all useful breeds of poultry, the Utility Poultry Club instituted the system of classifying the breeds in sections, granting awards in each. The White Wyandotte and White Leghorn breeds were each allocated a section, and ceased to compete with other breeds. Accordingly this and future competitions became a series of breed competitions, yet special awards were granted to the pen excelling all others regardless of breed. This step has been fully justified by results, and especially so with respect to Rhode Island Reds, Light Sussex, Buff Orpingtons, Buff Plymouth Rocks, and Black Leghorns, of which breeds there are now a greater number of pedigree-bred laying strains than formerly. However, the White Wyandotte, and perhaps more especially the White Leghorn, still retain their former popularity for egg-production, and high-laying strains of these breeds are more generally disseminated throughout the national stock of poultry than those of other breeds.

The 1915-16 competition has also a special interest in that 42 of the competitors' pens were retained, at Newport, for a further twelve months, which thus constituted a two years' competition. As was anticipated by many poultry-breeders, the results obtained generally indicated that the second year's egg-production was less than that of the first or pullet year. However, the economy or otherwise of retaining pullets, solely for the production of market eggs, through their second year, needs further confirmation.

In the following table the egg-production of these forty-two pens during the two years is shown.

TABLE A.

TWO YEARS EGG-LAYING COMPETITION, NEWPORT, SALOP, 1915-1917.
EACH PEN CONSISTED OF 6 BIRDS.

Section 1. *White Leghorn.*

No.	1st Year.		2nd Year.		2 Years' Total.		Score Value.
	Eggs.	Average.	Eggs.	Average.	Eggs.	Average.	
1	1353	225	829	138	2182	363	18 10 7¾
2	1265	210	720	120	1985	330	16 1 7¾
3	1125	187	745	124	1870	311	15 17 2¾
4	1196	199	686	114	1882	313	15 12 10¾
5	1092	182	811	135	1903	317	15 12 7¾
6	1261	210	619	103	1880	313	15 7 2½
7	1225	204	655	109	1880	313	15 3 7¾
8	1118	186	665	110	1783	296	14 6 7½
9	1003	167	688	114	1691	281	14 0 1
10	948	158	679	113	1627	271	12 19 0
11	1091	181	503	84	1594	265	12 17 7½
12	1087	181	452	75	1539	256	11 18 1½
13	1449	241	837	139	2286	380	19 2 4½
14	1086	181	658	109	1744	290	14 6 11½

Section 2. *White Wyandottes.*

							£ s. d.
15	1068	178	933	155	2001	333	17 9 8¾
16	1177	196	755	125	1932	321	17 0 7½
17	968	161	823	137	1791	298	15 3 6¾
18	1071	178	707	117	1778	295	14 19 5
19	1042	173	706	117	1748	290	14 10 2½
20	997	166	722	120	1719	286	14 4 7¾
21	938	156	706	117	1644	273	14 3 0
22	905	150	719	119	1624	269	13 8 9¾
23	949	158	549	91	1498	249	12 10 5¼
24	1513	252	809	134	2322	386	19 10 9
25	1169	194	846	141	2015	335	17 8 8¾
26	1109	184	841	140	1950	324	17 3 11¼
27	1210	201	798	133	2008	334	17 2 5¼
28	1168	194	604	100	1772	294	15 11 10
29	1093	182	733	122	1826	304	15 10 4

Section 3. *Buff Plymouth Rocks, Rhode Island Reds, White Orpingtons, Buff Orpingtons, Barred Plymouth Rocks.*

							£ s. d.
30	899	149	896	149	1795	298	15 9 6½
31	777	129	811	135	1588	264	13 11 9½
32	1000	166	534	89	1534	255	13 1 7½
33	1084	180	465	77	1549	257	13 0 0¾
34	1029	171	559	93	1588	264	12 13 4
35	751	125	574	95	1325	220	10 19 3¼
36	977	162	285	47	1262	209	10 14 6¼
37	773	129	372	62	1145	191	9 9 0¾
38	732	122	388	66	1120	188	8 18 1¾
39	471	78	455	75	926	153	7 5 10½

Section 4. *Light and Red Sussex.*

40	915	152	752	125	1667	277	13 19 8¾
41	988	164	631	105	1619	269	13 12 5½
42	892	148	623	103	1515	251	13 1 5¾

Since the termination of the 1916-17 competition at Newport, Salop, the Harper Adams Agricultural College have conducted their own egg-laying trials upon an extended scale, while those of the National Utility Poultry Society, now termed Egg-Laying Tests, were transferred to Dodnash Priory, Bentley, near Ipswich, where they have since been carried out in conjunction with the Great Eastern Railway Co. in connection with their scheme of Agricultural Development.

Although the egg-laying tests at Bentley have been conducted generally upon similar lines to former practice, the following changes were made. The number of pullets constituting a competitor's pen was reduced from six to five; the permitting of a reserve pullet or replacement of a pullet dying was discontinued; so far as possible five pens of each breed were grouped together in one house; and the former method of assessing the competitive value of eggs upon a money-value basis was abolished. Of these changes the latter is of the greater interest and importance.

Whilst it was granted that the ultimate value of a pullet's egg-production would be represented by the actual market value of the eggs, it was felt that the excellence of a pen's production should have a closer relationship to the value of the birds, and the pedigree strains they represented, for stock breeding purposes, or otherwise that while the number of eggs yielded was great they should possess a high marketable standard.

While there appeared to be evidence that the long-existing rule discounting the value of eggs weighing less than 2 ozs. had operated with effect, such eggs continued to be prominent in many of the pens. In view also of the abnormal market value of eggs during the war the National Utility Poultry Society for their 1917-18 egg-laying test initiated a new method for determining the competitive value of a pen's production in accordance with the following rule:—

> "For the purpose of the test the eggs laid by each pen will be assessed and recorded, according to their weight, as first or second-grade eggs. First-grade eggs shall be those weighing 2 ozs. or more. Second-grade eggs during the first ten weeks shall be those weighing less than 2 ozs. but not less than 1⅝ ozs., and for the subsequent period of the test not less than 1¾ ozs. Second-grade eggs shall be accepted as of equal value to first-grade eggs, but not more than 100 eggs shall be credited to the score of any pen in Sections 1 to 5, and in the case of Section 6, 200."

Section 6, termed the Championship Section, while open to all breeds of poultry, was limited to breeders who had gained at least one gold medal, or two silver medals, in previous competitions. In addition, the entry to this section required ten pullets instead of five, hence the increased allowance of 200 second-grade eggs to pens in this section. Thus by accepting second-grade eggs up to an average of twenty per unit bird, as being normal to a pullet's early production, as of equal value to first grade, the competitive value of eggs laid by each pen was expressed in terms of first-grade eggs. This method of assessing the eggs laid was also adopted by the Northern Utility Poultry Society.

An interesting series of egg-laying competitions has also been carried out by the Department of Agriculture and Technical Instruction for Ireland at the Munster Institute, Cork. Since 1913 these competitions have been carried out annually, for a period of eleven months from the 1st October. Up to the competition of 1919 all breeds of poultry competed with one another. The awards have been granted upon the basis of market value of the pen-yield of eggs, with a penalty for second-grade eggs. Since 1915 pens have been disqualified for awards when the weight of eggs laid averaged less than 24 ozs. per dozen.

The annual reports of these competitions, whilst fully recording the egg-production of each pullet and pen, both as to their number, weight, and market value, contains also information and instructive directions in connection with breeding, management and feeding of great value to poultry-stock breeders, farmers, and other egg-producers.

The following quotation from the report of the Seventh Irish Egg-Laying Competition is an ample testimony to the influence which these competitions have exerted upon the poultry stock in Ireland, which in 1916 exported 990,520,680 eggs, valued at £6,328,326.

> " The impetus given to the egg industry and the widespread adoption of better methods of breeding, feeding, and housing have been out of all proportion to the outlay and labour involved in the carrying out of these competitions. It was felt that nothing short of a practical demonstration of the value of correct methods would have the desired effect, but even the most hopeful of those responsible for the original conception could not have foreseen the far-reaching results that have followed."

As indicated, many egg-laying competitions have been carried out in various parts of the kingdom during the last twenty years. The accumulation of authentic data which these competitions have furnished is considerable and of much value to the economic development of the poultry stock-breeding industry, and, indeed, to that of egg-production generally. In the possession of such data we are far in advance of European egg-exporting countries, although it is still considered that our collecting, grading, and marketing organisation is inferior to that in operation in many of these countries.

While it is unnecessary here to exhibit many detailed statistical tables in connection with the results of these various competitions, it may be of interest generally to illustrate some of the leading aspects in connection with egg-production which have been brought into prominence.

The greater interest of competitions lies, perhaps, in the national or commercial aspect of the results obtained, as associated with the general average production of all the birds involved, and in respect to both the breeds and individual units. The winning pens, or super-producers, have also their place of importance, as these eventually constitute the basis for improvement in laying strains, both as to males and females. These super-producers are nevertheless exceptions, and unless correctly mated their progeny may not reach so high a plane. The much-advertised extreme egg-laying strains have but little existence in fact.

In the following table is shown the productive yield of some of the most prominent pens which gained high awards in recent egg-laying competitions :—

TABLE B.

Year.	Competition held by	Breed	Egg production of individual pullets constituting pen						Unrecorded	Pen Total	Average per pullet	Percentage of 2nd grade Eggs
			1	2	3	4	5	6				
1912-13	U. P. C.	White Wyandotte	257	234	245	212	228	209	..	1389	231	23·0
1913-14	,,	,,	230	227	238	211	201	231	1	1339	223	5·3
1914-15	,,	,,	230	182	223	228	210	198	1	1272	212	17·6
,,	,,	White Leghorn	226	214	177	243	254	184	5	1302	217	23·1
1915 16	,,	,,	273	231	258	222	223	242	..	1449	241	48·8
,,	,,	,,	211	235	238	243	242	199	..	1368	228	15·2
,,	,,	,,	240	206	255	231	199	226	..	1357	226	11 8
,,	,,	White Wyandotte	237	234	250	288	236	268	..	1513	252	67·6
,,	Irish Dept	,,	210	270	195	222	220	214	..	1331	221	Unreported
,,	,,	White Leghorn	214	216	214	203	237	195	..	1279	213	,,
1916-17	,,	White Wyandotte	200	227	211	205	245	251	..	1339	223	,,
,,	,,	,,	202	236	178	231	223	222	..	1292	215	,,
,,	H. A. C.	,,	278	225	228	301	202	261	6	1496	249	84·7
1917-18	N. U. P. S.	,,	222	283	194	209	261	..	..	1169	233	35·7
,,	,,	Black Leghorn	216	234	226	204	198	..	..	1078	215	6·9
,,	Irish Dept.	White Wyandotte	247	254	211	182	211	181	..	1286	214	Unreported
1918-19	,,	,,	202	234	215	236	216	256	..	1359	226	,,
,,	,,	White Leghorn	258	195	236	171	251	211	..	1322	220	,,
,,	N. U. P. S.	,,	219	187	192	162	226	..	..	986	197	10 9
1919-20	,,	,,	160	217	223	251	188	..	.	1039	207	3·6
,,	,,	Rhode Island Red	166	241	225	190	205	..	..	1027	205	1·3
,,	,,	Black Leghorn	211	237	188	216	200	..	..	1052	210	3·6

* Ten months. † Eleven months. ‡ Harper Adams Agricultural College.

As has already been indicated, up to the 1916-17 competition awards were granted upon the basis of the market value of the eggs laid, with a varying discount penalty, up to 20 per cent, upon eggs weighing less than 2 ozs. The above table shows that despite this penalty pens laying large numbers of undersized eggs secured awards, and also that it is possible to breed pullets yielding great numbers of eggs of a high marketable standard.

The gross production and general averages, &c., of the National Utility Poultry Society's twelve months' competitions during the last eight years is exhibited in the following table. For comparative purposes the results obtained in the Championship Section, instituted in the 1918-19 competition, are included in this general return, the pen entry being ten pullets instead of five :—

TABLE C.

Year.	Total No. of Pullets entered.	Percentage of White Wyandottes.	Percentage of White Leghorns.	Total Eggs Laid.	Percentage of Grades of Eggs.		Total Average per Bird.	Percentage of Birds laying		Best Pens. Average per Bird.	Worst Pens Average per Bird.	Food Cost per Bird.	
					1st.	2nd.		over 200	under 140			s.	d.
1912-13	600	33	18	91,115	76·4	23·5	151·9	15	40	231	67	7	11
1913-14	300	48	15	56,164	90·2	9·7	157·2	43	17	223	102	7	0¼
*1914-15	300	50	38	50,562	87·4	12·5	168·5	19	21	212	124	8	10¾
1915-16	600	29	29	98,898	65·5	31·5	164·0	24	26	252	78	11	6
1916-17	354	30	30	52,438	58·8	41·2	148·1	8·4	42	249	89	Not reported.	
1917-18	575	32	41	84,477	75·4	24·6	142·2	.	.	233	63		
1918-19	720	31	48	112,162	84·4	15·6	155·7			204	81		
1919-20	1440	30	39	231,777	78·6	21·2	163·3	19·1	25·62	2[illegible]7	72		

* Ten months only.

CHAMPIONSHIP SECTION.

1918-19	100	50	70	18,209	87·1	12·9	182·0	28·0	14·0	2[illegible]3	171	..	..
1919-20	120	33·3	58·3	22,320	73·3	26·7	188·3	47·5	14·1	215	184	..	..

Note.—The total averages per bird have been adjusted, due to the number of pullets being reduced by mortality.

The egg-laying competitions of the Department of Agriculture and Technical Instruction for Ireland, carried out at the Munster Institute, Cork, previously referred to, are especially interesting as showing a sustained progression in the gross average productive yield per bird.

The following table gives the number of pullets competing, number of eggs laid, cost of food, return for eggs, and gross profit for each of the seven Irish egg-laying competitions beginning 1912-13.

TABLE D.

IRISH EGG-LAYING COMPETITIONS, MUNSTER INSTITUTE, CORK.

1st Oct. to 31st Aug.	No. of Pullets.	No. of Eggs laid.	Average per Pullet.	Average Value per Pullet.		Cost of Food per Pullet.		Average price of Eggs per doz.	Return per pullet over cost of food.	
				s.	d.	s.	d.	d.	s.	d.
1913 . . .	318	38,199	120·1	11	2·8	5	8	13·05	5	6·8
1914 . . .	282	39,216	139·0	13	3·6	5	8·3	13·77	7	7·3
1915 . . .	264	39,764	150·6	17	6	7	0·5	16·75	10	5·5
1916 . . .	294	49,830	169·5	23	0·5	8	11·8	19·58	14	0·7
1917 . . .	210	36,660	174·6	32	7·2	13	10·7	26·89	18	8·5
1918 . . .	210	36,106	171·9	47	4	16	6	39·66	30	10·1
1919 . . .	306	55,124	180·0	53	3·4	20	0	42·59	33	3·4
1920 . . .	354	65,840	185·9	53	9	19	3·9	41·62	34	5·2

The White Wyandotte and White Leghorn breeds have also predominated over other breeds in the Irish competitions.

The proportion of pullets, entered in laying competitions, which produce less than 140 eggs continues at a high ratio, and is due to inefficient selection of the pullets to form the pen, and an unfortunate tendency of poultry-keepers to breed from hens that have produced great numbers of eggs in their pullet year, without sufficient regard being given to their size, rather than mating hens of good average production and size to males which by previous test-mating are known to possess the fecund factor.

The sectionalised productive yield in the following table amply illustrates this aspect, and though in many respects the figures approximate closely to those of previous competitions, they are perhaps the more valuable owing to the number of birds—1440—being greater than formerly :—

TABLE E.

NATIONAL EGG LAYING TEST, 1919-20. 1440 PULLETS.

Sectionalised Production.	No. of Pullets in section.	Per cent.	Percentage of Pullets in lay during			
			1st Month.	2nd Month.	3rd Month.	4th Month.
240 eggs and over . .	28	1·94	89	100	100	100
220 to 239	74	5·13	74	90	100	100
200 to 219	174	12·08	67	81	98	99
180 to 199	250	17·36	58	72	92	99
160 to 179	262	18·19	52	66	85	99
140 to 159	218	15·13	40	59	84	98
0 to 139	366	25·41	36	43	61	90
Mortality	68	4·72	Production excluded from above.			

The above table also exhibits the great importance of winter egg-production in its relation to that of the complete year. Indeed, provided pullets are hatched between February and early April, as must be presumed was the case with the above birds, many of the uneconomic units may be eliminated in the month of December. Irrespective of the laying strain of the breeding units, it is therefore advisable for poultry-keepers to rear quite 20 per cent of pullets in excess of the number desired for retention as egg-producers, eliminated units being killed for market.

Despite every precaution, egg-laying competitions, in addition to being affected by normal mortality, have been at times subject to infectious disease, the more troublesome being that of avian diphtheria. The origin is often difficult to trace. However, such troubles have more generally occurred where a number of pens are housed together. The transference of pullets in the autumn to a new site is in itself also a disturbing influence in its effect on the commencing date of production. Therefore it seems advisable for the pens to be separately housed and established in their new quarters two or three weeks prior to the commencement of the competition.

Egg-laying competitions have fulfilled a useful purpose in connection with the poultry industry as an incentive to the more careful breeding of utility varieties of poultry; and while the arrangement of the plant cannot be considered as a demonstration of that actually suitable for commercial egg-production, the competitions must always yield records and information of considerable economic value to the industry.

MILK RECORDS.

EIGHTEENTH YEAR—RECORDS OF 24,023 COWS.

By **WILLIAM STEVENSON**, B.Sc., N.D.A., N.D.D., Superintendent of Milk Records to the Scottish Milk Records Association.

SYSTEMATIC milk recording in Scotland was continued in 1920 on the same lines as in 1919 and previous years, though certain improvements in organisation and methods were introduced. The work was carried on under the direction of the Scottish Milk Records Association as formerly.

The Association in 1920 consisted of the following members:—

Name and Address	Body Represented.
Mr J P. Smith, Thirdpart, Auchinleck	Auchinleck and District Milk Record Society.
Mr Colin Thomson, Whiteleys, Alloway	Ayr and District Milk Record Society.
Lieut.-Colonel W. T. R. Houldsworth, Kirkbride, Maybole	Carrick Milk Record Society.
Mr John Young, Skerrington Mains, Hurlford	Central Ayrshire No. 1 Milk Record Society
Mr Thomas Drummond, Craighead, Hurlford	Central Ayrshire No. 2 Milk Record Society.
Mr D. Wardrop, Knockterra, Cumnock	Cumnock Milk Record Society.
Mr A. Y. Allan, Aitkenbar, Dumbarton	Dumbartonshire Milk Record Society.
Mr Mungo Sloan, Douglashall, Ecclefechan	Dumfriesshire Milk Record Society (Lower Annandale Circuit)
Mr J. S. Paterson, Quhytewoollen, Lockerbie	Dumfriesshire Milk Record Society (Upper Annandale Circuit).

Name and Address.	Body Represented.
Mr William Murray, Kirkland, Thornhill	Dumfriesshire Milk Record Society (Lower Nithsdale Circuit).
Mr D. A. Dickie, The Tower, Sanquhar	Dumfriesshire Milk Record Society (Upper Nithsdale Circuit).
Mr John Forster, Mains of Larg, New Luce	Dunragit Milk Record Society.
Mr James Hamilton, Headhouse, East Kilbride	East Kilbride and District Milk Record Society.
Mr James Mitchell, Wamphray, North Berwick	East Lothian Milk Record Society.
Mr Robert M. Reid, The Glen Farm, Falkirk	East Stirlingshire Milk Record Society.
Mr William Murdoch, Buntonhill, Kilmaurs	High Fenwick Milk Record Society.
Mr J. W. Miller, Lochhead, West Wemyss	Fife Milk Record Society, Circuit No. 1.
Mr J. W. Miller, Lochhead, West Wemyss	Fife Milk Record Society, Circuit No. 2
Mr John Finnie, Camphill, Dalry	"John Speir" Milk Record Society.
Mr John M'Caig, Belmont, Stranraer	Kirkcolm and Leswalt Milk Record Society.
Mr W. M. Menzies, Estate Office, Ardwell	Kirkmaiden & Stoneykirk Milk Record Society.
Mr Gavin Hamilton, British Linen Bank, Lesmahagow	Lesmahagow Milk Record Society.
Mr J. W. Edgar, Dourie, Port William	Lower Wigtownshire Milk Record Society, Circuit No. 1.
Mr James Barr, Low Glasnick, Kirkcowan	Lower Wigtownshire Milk Record Society, Circuit No. 2.
Mr Alex. Wyllie, Mossgiel, Mauchline	Mauchline Milk Record Society.
Mr Thomas Barr, Hobsland, Monkton	Monkton and District Milk Record Society.

Name and Address.	Body Represented.
Mr John Smith, Kilmaurs Mains, Kilmaurs	Montgomerie Milk Record Society.
Mr J. A. Carlyle, B.Sc., 2 Addison Place, Arbroath	North of Scotland Milk Record Society.
Mr John N. Watson, Cawhillan, Ochiltree	Ochiltree Milk Record Society.
Mr John Clark, Dunrod, Inverkip	Renfrewshire (Lower Ward) and Bute Milk Record Society, Circuit No. 1.
Mr John Telfer, Branchal, Bridge of Weir	Renfrewshire (Lower Ward) and Bute Milk Record Society, Circuit No. 2.
Mr William Howie, Carnwadric, Thornliebank	Renfrewshire (Upper Ward) Milk Record Society.
Brig.-Gen. J. A. Houison-Craufurd, Dunlop House, Dunlop	Stewarton and Dunlop Milk Record Society.
Mr H. W. B. Crawford, of Chapmanton, Castle-Douglas	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 1.
Mr W. P. Gilmour, Balmangan, Kirkcudbright	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 2.
Mr Hugh G. Baird, Kirkchrist, Kirkcudbright	Stewartry of Kirkcudbright Milk Record Society, Circuit No. 3.
Mr James A. Gilmour, South Cairn, Ervie	Stranraer and Kirkcolm Milk Record Society.
Sir Thomas Clement, K.B.E., of Netherton, 64 Albion Street, Glasgow	The Ayrshire Cattle Herd-Book Society of Great Britain and Ireland.
Mr James Howie, Hillhouse, Kilmarnock	
Mr Thomas C. Lindsay, Aitkenbrae, Monkton	
Mr A. W. Montgomerie, Lessnessock, Ochiltree	
Mr Matthew Bowie, Blackbyres, Barrhead, near Glasgow	The British Friesian Cattle Society.
Mr Alexander Munro, of Leanach, Culloden Moor, Inverness	

Name and Address.	Body Represented.
Mr F. N. M. Gourlay, of Milnton, Tynron, Thornhill Mr R. W. R. Mackenzie, of Earlshall, Leuchars, Fife	The Shetland Cattle Herd-Book Society.
Mr Alex. Cross, of Knockdon, 19 Hope Street, Glasgow Mr John M'Caig, Belmont, Stranraer Sir Hugh Shaw Stewart, Bart., C.B., of Ardgowan, Inverkip	The Highland and Agricultural Society of Scotland.
Mr Charles M. Douglas, C.B., D.Sc., of Auchlochan, Lesmahagow Principal W. G. R. Paterson, 6 Blythswood Square, Glasgow	The West of Scotland Agricultural College.
Mr Wm. Bruce, B.Sc., 13 George Square, Edinburgh Dr Alex. Lauder, 13 George Square, Edinburgh	The Edinburgh and East of Scotland College of Agriculture.
Mr G. G. Esslemont, C.B., B.Sc., 41½ Union Street, Aberdeen Professor Hendrick, Marischal College, Aberdeen Mr J. F. Tocher, D.Sc., 41½ Union Street, Aberdeen	The North of Scotland College of Agriculture.
Mr Andrew Clement, Netherton, Newton Mearns Mr Robert Dickie, of Messrs J. & W. Wallace, 498 Gallowgate, Glasgow Mr John Drysdale, 5 St Andrew Square, Edinburgh Mr James Dunlop, Board of Agriculture for Scotland, Edinburgh Mr George Hobson, 4 Southampton Row, London, W.C. 1.	Co-opted Members.

Chairman—Mr H. W. B. Crawford.

The following are the principal members of the staff :—

Secretary and Treasurer—Mr John Howie.

Superintendent—Mr William Stevenson, B.Sc., N.D.A., N.D.D.

Assistant-Superintendent—Mr Percy H. Hart.

ADMINISTRATION.

In 1920, as in previous years, the Association's milk recording was administered through local Milk Record Societies. The grant for milk recording from the Development Fund, obtained through the Board of Agriculture for Scotland, was continued in 1920 on the same conditions as formerly, and an additional sum of £840 was received for the purpose of carrying out a system of surprise check tests. The total grant for 1920 amounted to £3100.

The Ayrshire Cattle Herd Book Society continued their grant of £50 to the Association.

Grants were allocated to local societies on a somewhat different scale from previous years as follows :—

1. Societies testing at intervals of not more than twenty-one days :—

(*a*) The hire of the necessary milk-testing appliances free of annual charge, the society to upkeep the apparatus in good condition.

(*b*) An annual grant of 50s. to each new member in his first or second year, and of 15s. to each member in his third or fourth year.

(*c*) An annual grant of 28s. per member towards the cost of surprise check tests.

2. Societies testing at intervals of from twenty-two to twenty-eight days :—

(*a*) The hire of the necessary milk-testing appliances free of annual charge, the society to upkeep the apparatus in good condition.

(*b*) An annual grant of 30s. to each new member in his first or second year, and of 15s. to each member in his third or fourth year.

(*c*) An annual grant of 25s. per member towards the cost of surprise check tests.

During the latter part of 1919 every effort was made to obtain additional applications for membership of local societies in 1920, and about 150 applications were obtained throughout the various dairying districts of Scotland. For various reasons, such as members disposing of their dairy herds, &c., a certain number of members towards the end of the year intimated their resignation.

The accommodating of such a large number of new applicants in existing or new local societies, together with the reduction in the number of herds that could be tested by one recorder, consequent upon the introduction of a new system of surprise double tests or check tests, necessitated an extensive rearrangement of membership of almost all existing local societies. The superintendent was instructed to meet with the secretaries of the various local societies in order to group all members and new applicants into the most convenient circuits. This regrouping of local societies was successfully carried through, and in only a very few instances was serious objection offered. The twenty-five local societies which operated in 1919 all continued in 1920, and twelve new local societies or circuits were formed, viz. :—

1. Auchinleck and District Society.
2. Carrick Society.
3. Central Ayrshire No. 2 Society.
4. Lower Annandale Circuit.
5. East Kilbride and District Society.
6. Fife No. 2 Circuit.
7. Lower Wigtownshire No. 2 Circuit.
8. Renfrewshire (Lower Ward) and Bute No. 2 Circuit.
9. Stewartry No. 3 Circuit.
10. Stranraer and Kirkcolm Society.
11. East Stirlingshire Society.
12. East Lothian Society.

The total number of milk record societies or branch societies affiliated with the Association in 1920 was 37, and 37 trained recorders were constantly employed during the greater part of the year, compared with 25 in 1919. The total number of herds tested in 1920 was 587, compared with 491 in 1919. The total number of cows tested in 1920 was 24,023, compared with 20,786 in the previous year.

The following is a list of the Milk Record Scoieties which operated in 1920, with the name and address of the secretary of each society :—

Name of the Society.	Secretary.
Auchinleck & District	Mr Andrew Wilson, Finlayston, Ochiltree.
Ayr and District .	Mr Quintin Dunlop, Greenan, Ayr.
Carrick . . .	Mr W. D. M'Cubbin, Lochlands, Maybole
Central Ayrshire No. 1	Mr James Howie, Hillhouse Kilmarnock.
Central Ayrshire No. 2	Mr James Cochrane, Holmes Farm, Kilmarnock.
Cumnock . . .	Mr W D. Wardrop, Rigg, Auchinleck.
Dumbartonshire .	Mr John Bilsland, Quay Place, Dumbarton.
Dumfriesshire (Lower Annandale) .	Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Upper Annandale) . .	Mr Thomas Henderson, Solicitor, Lockerbie.
Dumfriesshire (Lower Nithsdale) . .	Mr Thomas Henderson, Solicitor, Lockerbie

Name of the Society.	Secretary.
Dumfriesshire (Upper Nithsdale) . .	Mr Thomas Henderson, Solicitor, Lockerbie.
Dunragit . . .	Mr John H. Wyllie, The United Creameries, Ltd., Stranraer.
East Kilbride and District . .	Mr Arthur Gilmour, 11-13 Macfarlane Street, Glasgow.
East Lothian . .	Mr James L. Nisbet, Easter Newton, Kirknewton.
East Stirlingshire .	Mr R. M. Reid, The Glen Farm, Falkirk.
Fenwick (High) .	Mr James Mather, Low Gainford, Fenwick.
Fife, Circuit No. 1 .	Mr Wm. Macniven, Royal Bank, Kirkcaldy.
Fife, Circuit No. 2 .	Mr Wm. Macniven, Royal Bank, Kirkcaldy.
"John Speir" . .	Mr William Longwill, Hawhill, Dalry.
Kirkcolm and Leswalt	Mr John M'Caig, Belmont, Stranraer.
Kirkmaiden & Stoneykirk . . .	Mr John M. H. Whyte, Kirkmabreck, Stranraer.
Lesmahagow . .	Mr Gavin Hamilton, British Linen Bank, Lesmahagow.
Lower Wigtownshire, Circuit No. 1 .	Mr David Breckonridge, Solicitor, Newton Stewart.
Lower Wigtownshire, Circuit No. 2 .	Mr David Breckonridge, Solicitor, Newton Stewart.
Mauchline . .	Mr Wm. Wallace, Auchenbrain, Mauchline.
Monkton and District	Mr William Howie, Brieryside, Monkton.
Montgomerie . .	Mr John Smith, Kilmaurs Mains, Kilmaurs.
North of Scotland .	Mr John A. Carlyle, B.Sc., 2 Addison Place, Arbroath.
Ochiltree . . .	Mr A. W. Montgomerie, Lessnessock, Ochiltree.
Renfrewshire (Lower Ward) and Bute, Circuit No. 1 .	Mr Archibald Blair, 40 Rue End Street, Greenock.
Renfrewshire (Lower Ward) and Bute, Circuit No. 2 .	Mr Archibald Blair, 40 Rue End Street, Greenock.
Renfrewshire (Upper Ward)	Mr J. Campbell Murray, 120 West Regent Street, Glasgow.
Stewarton and Dunlop	Mr James Clark, Fingart, Dunlop.
Stewartry of Kirkcudbright, Circuit No. 1	Mr Patrick Gifford, Solicitor, Castle-Douglas.
Stewartry of Kirkcudbright, Circuit No. 2	Mr Patrick Gifford, Solicitor, Castle-Douglas.
Stewartry of Kirkcudbright, Circuit No. 3	Mr Patrick Gifford, Solicitor, Castle-Douglas.
Stranraer & Kirkcolm	Mr James A. Gilmour, South Cairn, Ervie.

SEASON 1920.

The Table on this and the following page shows for each society the number of members, the number of cows tested, the average interval between the tests, and the duration of the recording season :—

Name of the Society.	No. of Members.	Number of Cows Tested.	Average Interval between Tests, in days.	Duration of Recording Season, in weeks.
1. Auchinleck and District .	14	455	21	52
2. Ayr and District . .	13	586	21	52
3. Carrick	14	635	21	52
4. Central Ayrshire, No. 1 .	14	519	21	52
5. Central Ayrshire, No. 2 .	15	513	21	52
6. Cumnock	15	517	21	52
7. Dumbartonshire . .	14	553	21	52
8. Dumfriesshire (Lower Annandale)	19	829	28	52
9. Dumfriesshire (Upper Annandale)	19	742	28	52
10 Dumfriesshire (Lower Nithsdale)	19	756	28	52
11. Dumfriesshire (Upper Nithsdale)	17	765	28	52
12. Dunragit	13	895	24	52
13. East Kilbride and District .	15	491	26	52
14. East Lothian . . .	9	99	15	35
15. East Stirlingshire . .	11	174	17	43
16. Fenwick (High) . .	17	634	26	52
17. Fife, Circuit No. 1 . .	16	508	24	52
18. Fife, Circuit No. 2 . .	13	320	20	52
19. "John Speir" . . .	20	548	28	52
20. Kirkcolm and Leswalt .	17	1181	28	52
21. Kirkmaiden and Stoneykirk	15	1182	28	48
22. Lesmahagow . . .	19	549	28	52
23. Lower Wigtownshire, Circuit No. 1	17	1152	28	44
24. Lower Wigtownshire, Circuit No. 2	19	917	28	46
25. Mauchline . . .	15	579	21	52
26. Monkton and District .	13	543	20	52

Name of the Society.	No. of Members	Number of Cows Tested.	Average Interval between Tests, in days.	Duration of Recording Season, in weeks.
27. Montgomerie . . .	19	562	28	52
28 North of Scotland . .	15	245	28	52
29. Ochiltree	14	440	21	52
30. Renfrewshire (Lower Ward) and Bute, Circuit No. 1	18	500	28	52
31. Renfrewshire (Lower Ward) and Bute, Circuit No. 2	18	479	28	52
32. Renfrewshire (Upper Ward)	16	557	25	52
33. Stewarton and Dunlop .	17	555	26	52
34 Stewartry of Kirkcudbright, Circuit No. 1	18	1034	28	52
35. Stewartry of Kirkcudbright, Circuit No. 2	19	1068	28	52
36. Stewartry of Kirkcudbright, Circuit No. 3	18	1227	28	52
37. Stranraer and Kirkcolm .	13	714	21	43
Total No. .	587	24,023	...	...

DEFINITIONS.

The milk records compiled by the Association are records of the estimated quantity of milk produced by each cow in a separate lactation, and of the estimated percentage of milk-fat contained in the milk. For convenience a gallon of milk was reckoned as 10 lb. A gallon of milk of average quality weighs almost exactly 10⅓ lb. The following further particulars concerning each record were also given, wherever possible :—

Name of cow, byre number, and herd-book number.
Sire of cow, and herd-book number of sire.
Dam of cow, and herd-book number of dam.
Date of birth.
Date of calving preceding opening of record.
Number of weeks in milk.
Date of next calving after record closed.

The following particulars of *the preceding record* were appended to each record, where available :—

Date of calving preceding opening of record.
Quantity of milk in gallons.
Percentage of fat in milk.
Number of weeks in milk.

The milk yields were estimated in respect of quantity and milk-fat percentage from the results of systematic periodic tests by trained recorders approved by the Association. The recorders visited the farms for this purpose at intervals varying from fourteen to not more than twenty-eight days, and each date of visit was regarded as the middle day of the period covered by the visit. Milk records estimated in this way approximate closely to the actual milk yields.

METHOD OF RECORDING ADOPTED.

A distinctive feature of milk recording in Scotland in 1920, as in former years, was that the records were entirely the work of trained official recorders. Recorders had previously to undergo a special course of training in milk recording at the West of Scotland Agricultural College Dairy School, or other approved College of Agriculture. Only candidates of good character and good general education were selected to attend these courses; and all recorders, before appointment, were approved by the Executive Committee of the Association. The Executive Committee fully realise how much depends upon the individuality of the official recorder.

All dairy farmers taking advantage of the Association's scheme were arranged into local Milk Recording Societies employing one or more recorders, the Executive Committee having the power to transfer members from one local society to another, in order to find accommodation for new applicants, and at the same time avoid overlapping of recorders' circuits. Each local society applying to the Association for licence to conduct milk recording under the Association's scheme signed the form containing the Association's rules and regulations, and agreed to conform to these rules. The local society selected and appointed their recorder or recorders from the list of approved recorders obtained from the Association. Apparatus, chemicals, sheets, and books were selected and arranged for by the Association, all byre sheets and record books used by the recorders being supplied free of charge. Thus, uniformity of methods was as far as possible assured.

The official recorder visited each herd at irregular intervals of not more than twenty-eight days, or more usually from eighteen to twenty-three days. He, or she, arrived at the farm in the afternoon, usually by means of a small pony and trap provided by the local society for the purpose, and remained at the farm overnight. All cows giving milk in each herd, as far as was possible, were included in the records. Each cow was clearly distinguished in the byre by a stall number on the wall, immediately in front of, and above the level of, the cow, and registered animals were also indelibly tattooed on the ears with distinctive registered tattoo markings. The cows were milked in the same rotation, evening and morning, on the occasion of the recorder's visit. The recorder weighed and sampled the milk of each cow in the evening, noting the time at which each cow was milked, and entered the results in the corresponding columns in the byre sheet, taking up a position in the byre as near to the milkers as possible, so as to have them in full view, and as far as practicable receiving the milk direct from the milker at the cow's side. He again weighed and sampled the milk of each cow in a similar manner in the morning and entered the results in the byre sheets. He then tested the mixed evening and morning sample for each cow by the Gerber method for percentage of milk-fat. He entered in the byre sheet a note of the average ration for the herd and any unusual conditions likely to affect the milk yields. The recorder was required to see that all milk samples and byre sheets were securely locked up overnight or during his absence. From the daily results the recorder calculated and completed the byre sheets, multiplying the yields by the exact number of days which had elapsed since the last test, but so calculating throughout that each day of visit was regarded as the middle day of the period covered by the test. Special ready reckoners were used to facilitate calculating and to ensure greater accuracy.

The byre sheets were written out in duplicate. The principal copies were posted at regular intervals to the offices of the superintendent, and the carbon copies left with the respective members. The recorder transferred the results from the extended byre sheet to the milk record book for the herd indelibly in ink, each cow being assigned a separate page, at the top of which full particulars of the cow were entered, including the indelible tattoo-marks on the animal.

All byre sheets were carefully revised and corrected in the superintendent's offices during the season, and a list of the necessary corrections sent to each recorder periodically to be entered in the record books.

Surprise visits of inspection were made to each recorder and to the members of local societies at the different farms periodically throughout the year by members of the Association's staff, and reports thereon submitted to the Executive Committee. The Executive Committee reserved the right to withdraw approval of any recorder at any time or to limit the period of service of any recorder with any particular society; while members of local societies refusing to observe any of the rules of the Association, or deemed to be guilty of conduct injurious to the true interests of milk recording, were liable to be temporarily or permanently suspended.

Surprise check tests of each herd were also systematically arranged in 1920, the records of each herd being checked in this way about three or four times throughout the year. The recorder was instructed by a letter from the superintendent's offices on a given date, unknown to recorder and owner of herd, to remain at the same farm another day and make another complete twenty-four hours' test. The surprise test results were entered on special buff-coloured byre sheets, and in the record books in red ink immediately below the results of the regular test of the previous day. The buff byre sheets were posted to the superintendent's offices with the other sheets, and any abnormal differences were immediately noted and reported to the Executive Committee.

As a result of this system of surprise check tests each page of the 1920 milk record books contains about three or four lines of entries in red, comparison of which with the immediately preceding entries provides valuable evidence of the genuineness or otherwise of the milk records.

All records were closed at the end of December, the current lactations being carried forward to the new books of the following year. Finally, summary sheets were written out in duplicate showing the total milk yields for each cow for the lactation or part-lactation, with full particulars of the cow, dates of calving, &c. The principal copy of the summary sheet was posted to the superintendent's offices with the record book, and the second copy left with the owner of the herd.

All record books and summary sheets are carefully revised, corrected in detail, and initialled in the superintendent's offices during the next few months, the record books being returned later to the respective members, and the summary sheets retained and bound for future reference, but this part of the work at time of writing has not been completed.

The milk records are next classified into three groups for cows and heifers respectively, on the following basis. Experience has confirmed the view that a very useful comparison is obtained by reckoning the yields at their estimated equivalent of milk of 1 per cent fat. Such a comparison takes into consideration both the quantity and the quality of the milk.

Cows with a milk record equivalent to not less than 2500 gallons at 1 per cent fat, and heifers with a milk record equivalent to not less than 2000 gallons of 1 per cent fat, are grouped into Class I. Cows and heifers with milk records of less than two-thirds of these amounts—viz., 1660 and 1330 gallons respectively, are grouped into Class III.

The following short table shows the corresponding values of these yields in fairly good milk of 3·5 per cent milk-fat :—

Class.	Yield in Milk of 1 Per Cent Fat. (Gallons.)	Corresponding Yield in Milk of 3·5 Per Cent Fat. (Gallons.)
Cows in Class I. .	Not less than 2500	714
Heifers in Class I. .	Not less than 2000	571
Cows in Class III. .	Less than 1660	474
Heifers in Class III.	Less than 1330	380

All cows and heifers falling between these limits come into Class II. Such animals naturally claim less attention than the good milkers or the obviously unprofitable animals. It should be noted, however, that Class II. includes a certain number of unclassifiable yields, as there are a number of instances where, from various causes, the results of a whole normal lactation cannot be obtained.

The Association will publish an Annual Report giving all details of the work of the Association, and of each local Milk Recording Society during 1920. This report will include tables showing for each farm the number of cows and heifers tested, the number and percentage included in Classes I. and III. respectively, and the average milk yield per herd. Each herd is included under the respective local society, but is represented only by an alphabetical letter, the owner being advised privately of the identity in the report of his own herd or herds. From these tables any member can see at a glance how his herd compares with other herds in his own or any other district, and the improvement in his own herd compared with previous years. The report will also show in tabular form the percentage of Class I. and Class III. animals of all animals tested under the Association's scheme during the year, and will thus afford a valuable indication of the progress in milk production generally.

An important feature of the Association's Annual Reports from 1917 inclusive is the register of good-milking cows with the names and addresses of owners, and full particulars of the milk records. This register includes only milk records eligible for Class I., and is further restricted to animals which have completed their lactation before the end of the year and given birth to another calf before 1st May of the year following. The fullest available particulars of each record are given, and all lists of records are submitted to the owners of the respective animals for revision before publication. The register is of great value to all interested in increased milk production and in the breeding and rearing of animals of the best milking strains, and is invaluable for future reference.

It should always be kept in mind when making a comparison of cows in different herds or in different districts that the different methods of dairying practised have a considerable influence on the milk yields, and that therefore milk yields alone do not necessarily indicate the true, relative, inherent, or hereditary milking qualities of the animal. But the authenticated milk records compiled by the Association ought to be of inestimable value to breeders and owners of dairy cows if properly interpreted.

GENERAL REVIEW.

The conditions for milk production towards the latter part of 1919, though still far from normal as compared with prewar conditions, were gradually becoming more favourable. The supply of suitable labour and feeding stuffs had considerably improved. Also, the benefits obtained by those dairy farmers who had consistently continued milk recording during the war years had become more apparent, and a number of former members of local societies had reason to regret having discontinued. Consequently, it had become less difficult to obtain applications for membership of local societies in 1920, both from former members and from entirely new applicants. In all, about 150 applications were obtained throughout the various dairying districts of Scotland. On the other hand, a certain number of the members of 1919, for various reasons, intimated their resignations, and a number of the new applicants could not be included in any milk recording society owing to their being isolated in more or less non-dairying districts.

Recording was carried on in 1920 by 37 local societies, comprising 587 members, compared with 25 societies and 491 members in the previous year, an increase of practically 100 members. The number of cows tested in 1920 was 24,023, compared with 20,786 in 1919, an increase of 3237 cows.

During the year 25 recorders, for various reasons, terminated their engagements. The Executive Committee, however, in the same period approved of 35 applicants for the position of milk recorder, and were able to recommend a sufficient number of qualified recorders. Twenty-two women recorders were employed in 1920 and 31 men recorders.

In this connection the Committee, as formerly, were indebted to the West of Scotland Agricultural College for meeting the Association's requirements by giving a special course of instruction for milk recorders in December 1919, in time to allow of vacancies being filled before January; and again in May 1920, to provide a further supply of qualified recorders to fill vacancies occurring from time to time throughout the season. Only candidates of good character and good general education were selected for these courses. In all, 26 candidates attended, and 25 obtained the certificate. The examiners reported that the qualifications of the students, as a whole, appeared to be above the standard of previous years.

The Executive Committee were able to purchase sufficient supplies of milk-testing apparatus for local societies at practically the same prices as in the previous year. They were also able to obtain the necessary sulphuric acid and amylic alcohol at the prices ruling in 1919. The purchasing of apparatus, acid, and alcohol by the Committee in bulk, and the supplying of these to local societies as required, while entailing a considerable amount of work, effected a very considerable saving to local societies and assured uniformity of supplies. There was some difficulty in procuring the new Gerber centrifuges required at the beginning of the year for new societies, as the Gerber Company, owing to shipping and other transport delays, could not give delivery within three months. However, old centrifuges were collected and repaired to serve temporarily, and a number of new machines were manufactured by a Kilmarnock firm.

The general conditions for milk production in 1920 were probably more favourable to high milk yields than in either of the two previous years. The spring throughout was unusually wet and cold, but the rainfall and temperature over the summer and autumn generally were conducive to good milking in dairy herds. Unfortunately, owing to the greater number of milk records to be dealt with, the increase in administrative work generally, and the relatively smaller staff at present employed, the 1920 records at time of writing have not been fully checked or classified, and a comparison of actual results cannot therefore be made; but it is anticipated that the percentage of Class I. records in 1920, and the average milk yields, will be found to be higher than in the immediately preceding years, though the inclusion of so many new herds never previously tested will probably result in a somewhat lower average standard than would otherwise have been attained.

Among the changes introduced in 1920, to be referred to here, was the new system of surprise check tests already described. The scheme worked throughout with comparative smoothness, though a good deal of administrative work was thereby entailed. One of the first conditions of success was to have the letter of instruction to the recorder delivered by post at the farm exactly on the proper date, and for this purpose accurate detailed information as to recorders' visits and postal deliveries had to be obtained.

The total number of check tests made during the season was 1595, or an average of approximately three check tests per herd. Only two herds showed an average for the herd of over 3 lb. milk daily less on the occasion of a check test, as compared with the previous day, and in both cases explanations were produced. Only four herds showed an average of over 2½ lb. less, including the two herds already referred to, and only fifteen herds an average of over 2 lb. less. The actual influence, however, of the surprise check tests on the authenticity of the records generally must be incalculable. The possibility of a check test at any visit must be deemed to have acted as a strong deterrent to any member who might otherwise have been tempted to adopt irregular practices. The check tests have done a great deal to disarm outside criticism of the accuracy of the official milk records, and to increase further the confidence of the general public in the records.

An alteration in the method of allocation of grants to new societies for the encouragement of milk recording was given effect to in 1920. For a number of years past all the important dairying districts of Scotland had been covered by milk recording societies, and in order to accommodate new applicants in the most convenient circuits to their farms and avoid overlapping of circuits it was necessary to include the majority of new members in existing societies, and regroup the societies accordingly. The new members joining older societies did not participate in these grants, and the main object of the grants—to induce new members to come forward—was not being fully attained. It was suggested in 1919 that a proportionate grant to each new member in place of a grant to each new society would be much more satisfactory, and this was agreed to. The more effective allocation of this grant, together with the powers now possessed by the Executive Committee of transferring at will members from one local society to another, should result in an increased number of new members from year to year.

Further efforts were made in 1920 to obtain additional applications for membership of local societies in 1921, and approximately 140 were obtained. Thirty-four members in 1920 intimated their resignations, including 11 members disposing of their dairy herds. The accommodation of the new applicants in the most convenient circuits necessitated a further rearrangement of membership in existing societies, and the formation of a number of new societies or circuits. A considerable step forward was also taken in several districts in the amalgamation of separate local societies into larger county or district societies, employing several recorders.

This system offers several advantages. It largely obviates in these districts the necessity of transferring members from one society to another separate society in order to include new members; members are transferred merely from one recorder's circuit to another, and all members pay on the same basis.

During 1920 amalgamations were effected to form the following societies:—

(1) Dumfriesshire Milk Record Society, employing 5 recorders in 1921.
(2) Lower Wigtownshire Milk Record Society (Mahars district), employing 2 recorders in 1921.
(3) Rhins of Galloway Milk Record Society, employing 6 recorders in 1921.
(4) Renfrew and Bute Milk Record Society, employing 4 recorders in 1921.
(5) Fife Milk Record Society, employing 2 recorders in 1921.

The 37 local societies or circuits of 1920 have all continued operations in 1921, and 7 new societies or circuits have already been formed—viz.:—

(1) The Highland Milk Record Society—Inverness and Dingwall Districts.
(2) Paisley Circuit—a new circuit under the Renfrew and Bute Society.
(3) Coylton and District Society.
(4) Dumfries and Lochmaben Circuit—a new circuit under the Dumfriesshire Society.
(5) Stewartry No. 4 Circuit—a new circuit under the Stewartry Society.
(6) Luce Valley Circuit. } Two new circuits under the Rhins
(7) Stranraer Circuit. } of Galloway Society.

The total number of local societies or circuits already formed for 1921 is 44, comprising 680 herds, compared with 37 societies and 587 herds in 1920.

ANALYSES FOR MEMBERS DURING 1920.

By DR J. F. TOCHER, Aberdeen, Analyst to the Society.

THE number of samples analysed by me during 1920 was 208, of which 56 were fertilisers, 42 were feeding-stuffs, 21 were waters, and 89 were miscellaneous samples. The miscellaneous samples included 47 milks, 5 soils, 23 examinations for poisons, and 14 sundry other examinations. The following table shows the numbers and nature of the samples analysed during the last six years :—

TABLE I.

	1920.	1919.	1918.	1917.	1916.	1915.
Fertilisers . . .	56	44	53	58	47	36
Feeding-stuffs . .	42	41	41	36	34	28
Waters . .	21	25	19	12	22	26
Miscellaneous . .	89	45	23	46	41	51
Total . . .	208	155	136	152	144	141

TABLE II.

FERTILISERS.

General.—The fertilisers examined were divided as follows :—

Mixtures	22
Concentrated potash fertilisers . .	9
Superphosphates	3
Sulphate of ammonia	4
Slags	9
Bone-meal	1
Mineral phosphate (Ephos) . . .	1
Limes and limestones	6
Coffee and chicory residue . . .	1
	56

The following table shows the average composition of the potato and turnip mixtures for 1920 :—

TABLE III.

AVERAGE COMPOSITION OF COMPOUND FERTILISERS.

	Turnip.	Potato.
Nitrogen	3·8	7·6
Soluble phosphate . . .	15·7	15·3
Citric soluble phosphate . .	5·2	2·4
Insoluble phosphate . .	3·5	2 0
Potash	3·0	3·0
Total phosphates . . .	24·4	19·7

There was an improvement in the average composition of potato fertilisers for 1920 when compared with the average composition of these fertilisers for 1919. The potash content of the concentrated potash fertilisers varied from 20·8 per cent (potash salt) to 60 per cent (muriate of potash), the average being 43·4 per cent. Among the samples of mineral phosphates was a sample containing total phosphate amounting to 65·44 per cent. It is desirable again to point out that the guarantee in the case of mineral phosphate should be a guarantee of the total amount of tricalcium phosphate present, and that citric solubility is defined in Statutory Rules and Orders, 1906, No. 944. Only one sample of high-grade slag was examined, and was found to contain 32·54 per cent of citric soluble phosphate. The proportion of total phosphate in slags varied from 14 per cent to 36 per cent, the average being 24·6 per cent. A sample was guaranteed to contain 22 per cent of phosphate, and was found to contain only 14 per cent. The difference in value between a 22-per-cent slag and a 14-per-cent slag amounted to as much as £2 per ton. All the slag samples, with one exception, were well ground. Three samples of superphosphate showed an average soluble phosphate content of 31 per cent calculated as tricalcium phosphate. A sample of coffee and chicory residue analysed for fertilising constituents was found to be of little value, containing, as it did, only 0·6 per cent phosphate, 0·4 per cent potash, and 2·1 per cent nitrogen. The samples of sulphate of ammonia gave an average nitrogen content of 20·6 per cent. One sample was rather lumpy, and not in a good sowable condition.

It may seem unnecessary to point out that every person purchasing a fertiliser prepared by an artificial process, or which has been imported from abroad, is entitled to receive an invoice stating the name of the article and what are the respective percentages of nitrogen, soluble phosphates, insoluble phosphates, and potash contained in the article. Occasionally some of the essential points are omitted in the invoice.

Limestones.—A sample of limestone was found to be deficient in lime to the extent of about 10 per cent. It is only fair to state that one cannot expect ground limestone or ground lime to conform so closely to a given guarantee as, say, a superphosphate or sulphate of ammonia. There are large natural variations in limestone as one passes from seam to seam. Limestone is extremely variable in composition on account of the fact that it is quarried for commercial purposes in various parts of the United Kingdom. Three samples analysed from the North of Scotland contained respectively 61, 75, and 76 per cent of carbonate of lime. One of the samples was a siliceous limestone containing about 1¼ per cent of magnesium oxide.

Magnesium oxide is undesirable in a limestone, as it retains its caustic character in the soil. Two samples also from the extreme north were found to be very good samples, containing high proportions of carbonate of lime. The first contained 92·8 per cent and the second 98·1 per cent. A sample of siliceous limestone from Argyllshire was found to contain 57 per cent. A sample from Dumfriesshire was found to contain 96·5 per cent.

The last of the series sent in was a sample also from the neighbourhood of Dumfries, which contained 90 per cent carbonate of lime. Those containing over 90 per cent or 95 per cent carbonate of lime are excellent limestones for commercial purposes. Those containing from 50 to 60 per cent are of value economically only in supplying the agricultural area within which the limestone is quarried. The samples of ground lime analysed were variable in character. The proportion of caustic lime varied from 19·5 per cent to 67·8 per cent.

FEEDING-STUFFS.

General.—The feeding-stuffs analysed included all the usual varieties, and also a greater number than usual of feeding-stuffs prepared from bye-products. These latter included sugar residue, coffee residue, dried dreg, ground chocolate waste, and malt culms. A sample of cotton-cake was analysed, and was found to contain about 7 per cent more albuminoids than the average, and about 8 per cent less fibre. The sample was found to contain 4·6 per cent of oil, 26·1 per cent of albuminoids, and 13 per cent of fibre. The usual proportions of these constituents in an undecorticated cotton-cake are 4½ per cent of oil, 19 per cent of albuminoids, and 22 per cent fibre. A fully-decorticated cotton-cake contains about 9 per cent of oil, 41 per cent of albuminoids, and 8 per cent of fibre. The sample appeared to be either a sample of a partially decorticated cotton-cake or a genuine sample of undecorticated cotton-cake of abnormal character, giving the purchaser the benefit of a high percentage of albuminoids.

The average composition of several samples of chocolate waste was 9·64 per cent of oil, 14·2 per cent of albuminoids, and 48·5 per cent of sugar. A sample of fish-meal was found to contain a high proportion of oil, and was reported on as being unsuitable for a feeding-stuff, although suitable to be used as a fertiliser. The sample was really a sample of fish guano. A revision of the Fertilisers and Feeding-stuffs Act would be necessary in order to protect purchasers of such substances as fish-meal from being offered inferior substitution products.

Fish-meal is a feeding-stuff manufactured from white fish, and should not contain any herring offal whatever.

White fish-meal is an excellent article of food for pigs and poultry if used cautiously in the proper proportion. Users of fish-meal should bear in mind that white fish-meal is a highly concentrated nitrogeneous food, and is not to be confused with fish guano, which is worthless as a feeding-stuff, and is useful only as a fertiliser.

Composition of Feeding-stuffs in 1920.—The following table (Table IV.) shows the results of analyses of thirty-six of the feeding-stuffs analysed :—

TABLE IV.

COMPOSITION OF FEEDING-STUFFS ANALYSED DURING 1920.

	Oil.	Albuminoids.	Soluble carbohydrates.	Fibre	Ash.	Moisture.
Meal	2·24	3·06	50·45	30·04	4·46	9·75
Malt culms . . .	2·61	27·50	39·57	8·55	10·88	10·89
Poultry meal . . .	5·31	13·43	56·70	7·50	5·26	11·80
Sugar residue . . .	10·12	5·50	19·48	12·04	49·74	8·12
Coffee residue . .	7·73	9·94	37·80	20·45	3·45	20·63
Coffee and chicory residue	7·84	10·81	42·66	28·64	2·82	7·23
Coffee residue . .	8·01	12·56	33·85	30·00	5·32	10·26
Sharps	5·53	15·87	52·45	9·33	4·20	12·62
Nosey chaff . . .	3·67	3·50	34·95	35·68	4·50	17·70
Ground nut cake . .	6·72	28·81	24·93	25·10	4·39	10·05
Cake	4·53	26·06	38·22	13·34	5·63	12·22
Dried grains . . .	9·65	20·81	35·64	23·30	2·31	8·29
Bean meal . . .	1·72	20·19	54·68	6·92	2·95	13·54
Poultry-food . . .	7·98	10·37	63·15	2·46	5·55	10·49
Grains	5·91	11·06	47·64	18·77	6·40	10·22
Grains	8·73	23·69	38·94	16·07	3·52	9·05
Ground nut-cake . .	8·54	27·44	20·43	26·09	9·00	8·50
Ground nut- and palm kernel-cake	7·90	22·56	43·49	9·12	6·12	10·81
Ground nut-cake . .	8·63	38·06	12·34	23·53	6·43	11·01
Soya- and cotton-cake .	6·77	28·12	33·18	14·58	5·30	12·05
Distillery grains . .	9·76	19·00	41·16	19·00	2·60	8·48
Distillery dreg . .	22·78	43·44	15·93	3·75	3·50	10·60
Cattle thriving mixture .	4·75	16·13	57·69	7·05	3·80	10·58
Dried grains . . .	10·00	23·19	38·56	16·73	3·80	7·72
Ground chocolate . .	9·52	8·63	53·67	1·83	5·66	7·69
Rice-meal . . .	16·55	11·94	46·96	5·90	8·05	10·60
Palm kernel-meal . .	4·60	16·31	30·34	32·15	4·10	12·50
Feeding-meal . . .	8·50	22·50	43·32	6·90	8·15	10·63
Flax-seed-meal .	13·07	13·37	31·11	18·33	15·04	9·08
Chocolate waste . .	10·87	13·88	39·38	15·12	10·45	10·30
Dried grains . . .	10·06	19·50	40·71	15·63	3·19	10·91
Common thirds . .	4·73	16·25	51·29	9·75	5·14	12·84
Fine thirds . . .	5·23	17·31	56·68	4·72	3·67	12·39
Bombay linseed cake .	10·80	46·12	22·68	3·25	9·15	8·00
Linseed-cake . . .	10·97	28·87	33·24	8·87	5·15	12·90
Ground nut-cake . .	11·17	29·31	19·16	25·48	4·55	10·38

SOILS.

Most of the samples were found to be fairly rich in fertilising constituents, but owing to their acid nature applications of lime were recommended. In one case where the potato crop had been deteriorating, the history of the case

showed the soil to have been infected with stem rot. Cereal crops, which are not attacked by the bacteria causing stem rot, should be sown for at least three years, in order to get rid of the trouble.

WATERS.

Of the twenty-one samples of water analysed, six were found to be of excellent quality, four good, five fair, one doubtful, two bad, two very bad, and one was found to be suitable if stored and filtered.

MISCELLANEOUS.

Milks.—Forty samples of milk were submitted to chemical analyses, and five samples to bacteriological analyses. The butter fat in the samples varied from 1·5 per cent to 5·26 per cent. There was also wide variation in the proportion of solids not fat. The mixed milk of a small herd was found to contain as low a proportion of solids not fat as 7·7 per cent. This sample contained a proportion of sodium chloride much above the average. It is well known that before calving the mineral constituents in milk may deviate significantly from the average.

Bacteriological Samples.—Three samples of milk were examined for the tubercle bacillus, with negative results in each case.

Samples of feeding-stuffs were examined for anthrax, as several deaths from anthrax had occurred among cattle being fed with a particular brand of cake. It should be pointed out that contamination of feeding-cakes by the anthrax bacillus is not likely to occur, owing to the process of manufacture of such cakes; but infection might occur if the containers, such as bags, had been previously used to hold bones. Bones are sometimes found to harbour this organism.

A sample of ewe's milk was found to contain only 1·65 per cent as against an average of about 11 per cent. This large deficiency was reported as being the probable cause of death of lambs and also of scour. The sample was a clean milk from the bacteriological standpoint. A sample of mare's milk was found to be bacterially infected, and to be the probable cause of death of a foal.

Poisons.—Among the examinations for poisons, five were cases of lead poisoning in dairy cows and bullocks. There was one case of strychnine poisoning, one case of arsenic poisoning, and one case of phosphorus poisoning. An examination of dried grains for poisons gave negative results. This was a case where two horses had died after having been suddenly put on to a ration of dried grains. It was found that the dried grains possessed a high degree of acidity.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1920, AND THE WEATHER OF SCOTLAND IN 1920.

THE CROPS.

THE following comparison of the cereal and other crops of 1920 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The queries issued by the Secretary were in the following terms:—

1. What was the quantity, per imperial acre, and quality of grain and straw, as compared with last year, of the following crops? The quantity of each crop to be stated in bushels. What quantity of seed is generally sown per acre?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time? and if so, how long?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively? The quantity to be stated in tons and cwts.
4. Was the meadow-hay crop more or less productive than last year?
5. What was the yield of the potato crop, per imperial acre, as compared with last year? The quantity to be stated in tons and cwts. Was there any disease? and if so, to what extent, and when did it commence? Were any new varieties planted, and with what result?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird? Was more than one sowing required? and why?
7. Were the crops injured by insects? State the kinds of insects. Was the damage greater or less than usual?
8. Were the crops injured by weeds? State the kinds of weeds. Was the damage greater or less than usual?
9. Were the pastures during the season of average growth and quality with last year?
10. How did stock thrive on them?
11. Have cattle and sheep been free from disease?
12. What was the quality of the clip of wool, and was it over or under the average?

From the answers received, the following notes and statistics have been compiled:—

EDINBURGH DISTRICT.

West Lothian. *Wheat*—Yield, say 52 bushels; seed sown, 4 bushels; straw good. A large acreage of wheat had to be ploughed up owing to destruction by grub. *Barley*—Yield, say 52 to 56 bushels; seed sown, 4 to 5 bushels; straw good and bulky. *Oats*—Yield, say 48 to 52 bushels; seed sown, new varieties, 6 bushels; older variety, 4 to 5 bushels; straw good and plentiful. *Harvest* very late, owing to wet season, and prolonged by broken weather. *Hay*—Good crop, but owing to the wet weather much damage done; yield, 50 cwt. *Meadow-hay*—Very little grown. *Potatoes*—Yield, earlies, 4 to 5 tons per acre; late, 7 to 8 tons per acre; very few new varieties grown. *Turnips*—Yield, say 20 tons per acre; quality good; owing to wet weather difficulty was experienced in keeping them clean; braird was slow in coming. *Insects*—Wheat considerably damaged by insects. *Weeds*—Owing to wet weather, dirt was difficult to keep down. *Pastures* much better than last year, owing to wet season. *Live Stock* did well. A few cases of anthrax among cattle and sheep. *Clip of wool*—Average.

East Lothian (Upper District). *Wheat* varied considerably, according to date of being sown: where late sown, and especially after a white crop, suffered from a grub of some species which thinned it out; such cases were 30 per cent short of an average. On the whole, this crop would be 8 bushels short of the 1919 crop; straw in proportion; 4 bushels of seed sown. *Barley* threshed well up to expectations, with some exceptional returns; average about 46 bushels per acre; the quality of grain was rather below East Lothian's quality, and in late districts the crops were very much damaged by wet, close weather, which caused considerable sprouting on the shoots; straw rather below an average; quantity sown, from 3 to 3½ bushels per acre. *Oats*—A full average, although a little deficient in quantity of straw, and might average 58 bushels, excepting the very late districts, which also suffered from the weather; seldom has the straw of this crop been so high in quality; 6 bushels thick-skinned, and 4½ bushels potato, sown per acre. *Harvest* began about usual time, and on many farms was one of the shortest for years, until the weather broke, which caused much damage in late districts. *Hay* yielded 45 cwt. per acre; rather less than last year. The weather was rather unfavourable for two weeks, causing considerable damage and expense, and delayed cutting until the crop was too ripe. *Meadow-hay*—None grown. *Potatoes*—Potatoes on the whole above the average, with an 8-ton ware crop on many farms; no disease; considerable number of new varieties; cropping powers good, quality poor, hence the small price for ware of such. *Turnips*—Best for many years, with a difficulty to get stock to consume them; average about 20 tons; some second sowing; turnip-fly very bad for ten days or so. *Insects*—No injury except to the wheat crop. *Weeds*—Some farms still infested with wild mustard; spraying with sulphate of copper proved an effective cure. *Pastures*—Same as last year, but suffered in the late summer owing to the long dry weather. *Live Stock* throve well. Cattle and sheep free from disease.

East Lothian (Lower District). *Wheat*—36 to 42 bushels; fair crop; seed, 3 bushels drilled, 4 broadcast. *Barley*—A good crop; 42 to

48 bushels; quality not so good as last year, which was a record one for quality; bad harvesting weather seriously damaged much of the crop; prices received very disappointing; seed, 3 bushels drilled. *Oats*—52 to 60 bushels thick-skinned varieties; others, 12 bushels per acre less; seed, 4 bushels potato varieties, 5 to 6 bushels thick-skinned. *Harvest* a fortnight later than average; weather very uncertain; heavy dews at night alternating with rain made progress slow, and resulted in it being the most protracted harvest for fully 30 years. The Daylight Saving Act also tended to damage the crop. *Hay*—Lighter crop, generally about 2 to 2½ tons. *Meadow-hay*—None grown. *Potatoes*—A variable crop; some very good fields; quality not uniformly good, as "immune" varieties are not the fine quality that older ones were; not much disease; yield about 8 to 9 tons where good, others about 6 tons. *Turnips*—A good crop; showery weather throughout growing period made them always look well. *Insects*—Not much injury. *Weeds*—Charlock prevalent on many farms, also thistles. *Pastures* fairly good. *Live Stock* throve fairly well. Cattle and sheep free from disease. *Clip of wool* rather under average.

BORDER DISTRICT.

Berwickshire (Merse). *Wheat*—30 to 42 bushels; grain a very poor sample owing to the wet harvest, with a large quantity of straw; seed, 2½ to 4 bushels. *Barley*—32 to 48 bushels; looked well, but the heavy rains near harvest ruined the crop; samples of grain, except in a few cases, were very poor; seed, 2 to 3½ bushels. *Oats*—38 to 50 bushels; looked well, but did not fill as it would have done with good weather; sample of grain poor; large yield of poor quality straw. *Harvest* began about a week later than last year; long drawn out, lasting six to nine weeks on some farms; weather of the very worst description, with a lack of wind to help to dry the sodden sheaves. *Hay*—An excellent crop of good quality, yielding 2 to 4 tons per acre; in most cases secured in good order. *Meadow-hay* also a very good crop; yielded 2 to 3 tons per acre. *Potatoes* yielded well, fully the average; quality poor owing to too much moisture; some disease. *Turnips* were the best crop of the year, and very much above the average; yielded 50 tons per acre; quality excellent. The crop brairded well; no second sowing. *Insects*—Insect pests were not especially noticeable. *Weeds* did not materially affect the crops. *Pastures* grazed especially well. There was an abundance of autumn and winter keep. *Live Stock*—Both sheep and cattle did extra well, the latter being nearly half fat when shut up to feed off. Cattle and sheep free from disease. *Clip of wool*—About the average.

Berwickshire (Lammermoor). *Wheat*—Almost none grown. *Barley*—Fair crop, but inferior yield; in later areas very much damaged by bad harvest weather; 28 bushels; seeding, 3 to 3½ bushels. *Oats*—Some very poor crops, and a large proportion badly damaged by wet weather in harvest; average under 30 bushels; a great deal of the oat crop cut very green; both grain and fodder generally poor quality; seeding, 4 to 6 bushels according to variety of oats sown. *Harvest* was very late and very prolonged—from the second week in September till the end of October. *Hay*—Crop generally good, except that a proportion was thin on the ground owing to the bad seeding of the previous year of drought; generally, the crop may be said to double that of last year, up to, and in some cases exceeding, 2 tons per acre; generally got of fair average quality. *Meadow-hay*—Meadow-hay was quite double last year's crop, and was got fairly well, and generally was a very useful crop. *Potatoes*—About 7 tons per acre, instead of about 4 tons last year; very fine quality, and got pitted in the finest possible condition; mostly disease-resisting and "immune" varieties. *Turnips*—A very fine crop; swedes, 24 to 30 tons; yellows, &c., averaging over 20 tons; all over the season was most favourable to the turnip crop. *Insects*—No injury. *Weeds* were more in evidence than usual; arable land, generally, not so clean as before the war; the farmers, grudging the high wages, are not overstaffed, and in a growthy year it was found to be difficult to keep the weeds in check. *Pastures* were luxuriant all season, and of much over average growth and quality. *Live Stock* did very well. Cattle and sheep generally healthy There has not been anything abnormal in the way of disease; "scrapie" was very prevalent in sheep stocks. *Clip of wool* a good average.

ROXBURGHSHIRE. *Wheat*—Very little grown. *Barley*—26 bushels; straw, 16 cwt.; seed, 2½ to 3 bushels; light crop; seed sown about 20th March; no more sowing until 20th April; did not do so well. *Oats*—30 bushels; 16 cwt. straw; seed, 4 to 6 bushels; poor crop except on good corn land; late seed-time. Cold nights and want of growth operated against crop. *Harvest* began about ten days later than last year. *Hay*—Good crops; 30 to 35 cwt. *Meadow-hay* better than last year; about 25 cwt. *Potatoes*—Better than last year; average 5½ tons; no disease. *Turnips*—Very good crop all over; few blank acres; might average 18 tons, good quality; no resowing required. *Insects*—No damage. *Weeds*—No injury. *Pastures*—Much more grass than last year. *Live Stock* did well. Sheep and lambs were good but rather fewer of them. Cattle did well on the grass, but a scarcity of them. Cattle and sheep healthy; little disease. Sheep suffered from various diseases—"louping-ill," "braxy," "scrapie." Good many died with sickness caused by the new shaws on the turnips. *Clip of wool*—Good quality; about an average.

SELKIRKSHIRE. *Wheat*—Crop only fair; 38 bushels. *Barley*—Not generally of good quality; moderate crop; 32 bushels. *Oats*—Good crop, but late; 37 bushels. *Harvest* began 14 days later than last year. *Hay*—2 tons of good quality. *Meadow-hay*—A good crop, and on the whole good quality; 25 cwt. *Potatoes*—Good crop, 6 tons; no disease. *Turnips*—Owing to the fine autumn and winter turnips finished a very good crop—up to 24 tons; no second sowing required.. *Insects*—No injury. *Weeds*—Much as last year. *Pastures* were good all through; wild white clover proved a most valuable addition to all pastures, and in many cases doubled their productivity. *Live Stock* throve very well. Cattle and sheep free from disease. *Clip of wool*—A full crop of good quality; fall in blackfaced wool of 80 per cent in price.

PEEBLESSHIRE. *Wheat*—Very little grown, if any. *Barley*—40 to 50 bushels; 18 cwt. straw; seed, 4 bushels per acre. *Oats*—50 to 60 bushels; 20 to 30 cwt. straw; seed, 5 bushels per acre. *Harvest* began about one week later than usual, and later in higher districts. Good weather favoured the later districts, but on the whole not much loss of grain, taking district all over. *Hay*—Ryegrass light crop; about 22 to 28 cwt. per acre, part of which was secured in bad order, and in some cases spoiled by weather. *Meadow-hay* more productive than last year; from 28 to 35 cwt. per acre. *Potatoes*—About 6 and 7 tons per acre; quality good. *Turnips*—Good in some parts, middling in others—from 12 to 16 tons per acre; crop brairded exceedingly well when seed was in before term, but later sowings retarded crop. *Insects*—Little or no damage done. *Weeds*—Crops were damaged by weeds more than usual, and owing to wet season there was little chance of killing them *Pastures* much better than last year and grazed well. *Live Stock* did well. Cattle and sheep, very little disease, if any. *Clip of wool*—Quality good, and a little heavier clip than previous year.

DUMFRIES DISTRICT.

DUMFRIES (Annandale). *Wheat* — Very little grown. *Barley* — Crop about an average both as regards straw and grain. Owing to a sunless time during harvest the grain was somewhat dull in colour. Average yield of grain, 37 bushels per acre; straw, 24 cwt.; seed sown, 3½ to 4 bushels per acre. *Oats*—Sowing began about 22nd March, a week earlier than usual, but was almost immediately stopped by heavy rains which continued until 8th April. Thereafter the work of seeding was carried on in favourable weather, and was completed before the close of the month. Exceptionally wet weather followed (with low temperature at nights) throughout May and June. The wet summer caused a second growth to spring up. The crop did not ripen regularly, and had to be cut rather green. This greenness resulted in a considerable amount of heating in the stack; consequently there was a large proportion of the oats not adapted either for milling or for seed. Yield—grain, "Potato" and "Sandy," 38 bushels; "Victory," "Yielder," "Record," &c., 65 to 70; straw, 27 cwt. per acre. Seed sown: old varieties, 4 to 6 bushels; newer, 6 to 7 bushels per acre; when drilled, one bushel per acre less. *Harvest* was a week later than usual, and was also delayed by wet weather. It became general about 6th September. *Hay*—Crop heavier than last year but owing to wet weather harvesting was a tedious process, and the crop poor in quality. Very few really good samples of hay to be found. Clovers did not do well. This was generally thought to be the result of the low temperature that prevailed during summer. Weight of crop, 28 cwt. per acre. *Meadow-hay* would bulk about the same as in 1919, but the quality, owing to the weather experienced, was not so good. A large proportion in the earlier districts was wasted, but later (about 12th August) favourable weather set in; the late districts and hill farms got the crop secured in good order. *Potatoes*—During the period of growth it did not look as if it was to be a profitable year for potatoes, but, at gathering time, the yield was above expectation. Disease showed itself early, and where spraying was not resorted to a considerable proportion of the crop was lost. Some varieties, such as "Arran Chief," "Kerr's Pink," "Tinwald Perfection," &c., came through with practically no disease. Average weight of crop, 5 tons per acre. Few new varieties were tried. Some farmers in 1919 purchased seed of a new immune variety at £50 per ton. The resulting crop in 1919 was a fair average, but this season's crop was a failure—half the tubers were diseased. *Turnips*—The crop in Annandale has been very disappointing. On the majority of farms there is not half an average crop, owing to a heavier rainfall than has been experienced for very many years. The ground was prepared and the seed sown during wet weather. Plants came away and no second sowing was necessary, and through May and June the weather continued wet. Successive horse-hoeing to keep down weeds poached the land, and unfitted it for growing a crop; hand- and horse-hoeing simply transplanted weeds. Finger-and-toe from the same cause was prevalent; and on not a few farms the crop suffered seriously from this disease. Average weight of crop will not exceed 12 tons per acre. *Insects*—Crops generally were free from insect pests. *Weeds*—Crops of all kinds, but especially green crops, were injured by weeds. There was no chance to keep these under owing to the wet season. Surface and deeper-rooted weeds were alike in this respect. *Pastures* were of more than average growth, but owing to lack of sunshine the quality was poor. *Live Stock* did not come off the grazings in their usual condition. *Cattle*—Garget and udder troubles have been unusually prevalent amongst "back-end calvers." This is generally attributed to the cold wet season. As last year, fewer deaths have occurred amongst sheep from braxy and louping-ill than in former years. *Clip of wool*—Quantity and quality was above the average, but the returns from this commodity have not yet swelled the farmers' bank account, as practically the whole clip is still in the brokers' hands, owing to lowered prices and a lessened demand.

DUMFRIESSHIRE (Nithsdale). *Oats*—10 bushels less than last year; much unripe corn; 5 to 6 bushels sown per acre, which brairded well but died away afterwards; straw very thin and short; rain continued too long, and soured the ground. *Harvest* began about usual time. *Hay*—1 ton more than previous year; heavy crop; 35 cwt. *Meadow-hay*—Double previous year. *Potatoes*—1 ton less than previous year; no disease; shaws got frosted early, stopping their growth. *Turnips*—Too wet weather at seeding-time; much seed never brairded on heavy land; good crop on suitable land; 18 tons. *Insects*—No injury. *Weeds*—Long-continued rain prevented cleaning; spiny and redshank choked plants; greater damage than usual. *Pastures* much more abundant than last year. *Live Stock* throve very well. Cattle and sheep free from disease. *Clip of wool*—Good quality and well over the average quantity.

DUMFRIESSHIRE (Eskdale). *Wheat*—None grown. *Barley*—Only a very odd acre or so grown, not enough to estimate yield, &c. *Oats*—There was a lot of greenheads amongst oats, consequently not the yield, which would be about 30 to 35 bushels per acre; quality not good; straw much more abundant than last year, and most was harvested in good condition. The usual seeding of "Fielder Oats" is 6 to 6½ bushels per acre, and rather less when "Potato Oats" were sown, but "Fielder Oats" mostly grown now, as they ripen much earlier, and do not get so much laid with winds and rain. *Harvest* began about usual time; bad weather to start with, but finished up with good harvest weather. *Hay*—Very much heavier crop than last year, but not secured in best of condition as weather was very changeable. Yield about 33 cwt. per acre. *Meadow-hay*—Much heavier crop; wet spring and summer favoured growing. Yield about 30 to 35 cwt. per acre. *Potatoes*—About half the yield of last year, 4 to 5 tons per acre; a lot of bad potatoes at lifting time, no doubt due to wet summer. No new varieties planted; "Great Scot" still most popular. *Turnips*—Crop heavier than last year, as the turnips kept growing on all autumn; would yield about 25 tons per acre. Most of crop brairded well; some odd acres went with fly and had to be resown, but not a great deal. *Insects*—No damage. *Weeds*—More plentiful, owing to wet summer season. "Charlock" very bad in some places. *Pastures* were more than average growth, and quality very good, as *Stock* did well all summer. Cattle very free from disease. Sheep freer than usual. Braxy still prevalent in some places, but not nearly so bad as most years. *Clip of wool*—Quality about the average.

KIRKCUDBRIGHTSHIRE. *Wheat*—None grown. *Barley*—None grown. *Oats*—A very good crop of both straw and grain; yielded 55 bushels per acre; seed sown, 4 bushels per acre. *Harvest* began about the usual time; very protracted, and lasted six weeks in many cases. *Hay*—50 per cent over last year; 2 tons per acre. *Meadow-hay*—About equal to last year. *Potatoes*—A heavy crop of early and late varieties; comparatively free from disease; yielded 9 tons per acre; increased extent of immunes planted, including "Dargill Early," "Great Scot," "Lochar," and "Tinwald Perfection." *Turnips*—A heavy crop of 20 tons; brairded well, and suffered few vicissitudes. *Insects*—No injury. *Weeds*—No damage. *Pastures* of average growth and quality with last year. *Live Stock* throve well. Cattle and sheep free from disease.

WIGTOWNSHIRE. *Wheat*—36 to 40 bushels; grain fair; straw good; acreage sown very small; 4 bushels sown per acre. *Barley*—38 to 40 bushels; grain and straw very good. *Oats*—36 to 46 bushels; grain irregular in quality; much spoiled by continued wet before and after reaping; when sown by drill about 4 bushels of seed used; by hand about 6; of the new varieties as much as 8 bushels sown. *Harvest* began from two to three weeks later than usual—from the 8th to 20th of September; finished about 27th October except on a few late farms. *Hay*—Very heavy crop; about 8 to 10 cwt. more per acre than last year; quality not so good. *Meadow-hay*—Very good crop; much spoiled by wet weather. *Potatoes*—Very moderate crop; from 3 to 5 tons; generally poor quality; not much disease. *Turnips*—From 10 to 12 tons; crop brairded well, but perished in many black land fields after thinning; a great deal of canker and finger-and-toe; the worst crop since 1879. *Insects*—No damage. *Weeds*—Impossible to get green crop fields kept clear of weeds, as horse-work could not be done with continued wet weather. *Pastures* were very good all through the season; much better than last year. *Live Stock* of all kinds throve very well. Cattle and sheep free from disease. *Clip of wool*—Average, both for quantity and quality.

GLASGOW DISTRICT.

AYRSHIRE. *Wheat*—43 bushels; of second quality, 60 lb. per bushel; straw 32 cwt. per acre; 3 to 3½ bushels seed per acre. *Barley*—37 bushels; second quality, 54 lb. per bushel; straw, 24 cwt. per acre; 3½ to 4 bushels seed per acre. *Oats*—42 bushels per acre; quality variable; much of the crop was harvested before it was ripe, and a considerable quantity in some districts was heated in the stack; 38 lb. per bushel; straw, 26 cwt. per acre; 5½ to 7 bushels seed per acre. *Harvest*—From two to three weeks later than usual.. *Hay*—Crop, 1 ton 18 cwt. per acre; great want of clover; quality poor; few plots escaped more or less damage from weather. *Meadow-hay*—1 ton 14 cwt. per acre; about the same as last year, but the quality was inferior. *Potatoes*—About 8 tons per acre; disease commenced about the end of July, and seed put in the boxes in the end of July and during August kept badly; from 25 to 50 per cent in some cases went bad in the boxes; no new varieties were planted in quantity; a few small lots for experimental purposes. *Turnips*—14 tons per acre; quality poor; heavy losses from finger-and-toe; crop brairded well, and little resowing was necessary. *Insects*—Not more than usual, and probably less, as the season was cold and damp and insects were less numerous. *Weeds*—Not injurious to any extent, although greater difficulty was experienced in keeping weeds under on account of the weather conditions. *Pastures*—Grass was generally plentiful in the early season, but the quality seemed to be lower than in average seasons. *Live Stock* throve only moderately well. Cattle and sheep free from disease generally. *Clip of wool*—About an average.

BUTE. *Wheat*—Very little grown; average crop; good quality. *Barley*—Very little grown; fair crop. *Oats*—Under average; 38 bushels per acre. Harvest commenced 1st September and finished middle of October; very backward harvest weather; crop cut in forenoon was damp. *Harvest*—Crop stacked too soon, resulting in heating; crop cut in afternoon was got in the best of order although a little later; the stackyards about a fourth less than usual. *Hay*—Above the average; about 2 tons per acre; unfavourable weather for haymaking. *Meadow-hay*—Very little grown. *Potatoes*—Commenced digging last week in June; good crop; started about 7 tons per acre and finished about 11 tons per acre; average 9 tons per acre; no disease; very fine quality; no new varieties. *Turnips* brairded well; 16 to 20 tons per acre; under an average; a great deal of damage by wood-pigeons, more so the later-sown swede turnips. *Insects*—Very little damage. *Weeds*—Difficult to keep down owing to wet weather. *Pastures*—Good. *Live Stock* did well. Cattle and sheep free from disease. *Clip of wool*—Fair average; quality good.

ARRAN. *Wheat*—None grown. *Barley*—None grown. *Oats*—A moderate crop; seed sown from 5 to 6 bushels per acre; harvest eight days later than 1919. Tedious harvest with wet weather and fog. Secured in fair condition by the end of October; threshing bad; say 30 bushels per acre, and grain light. *Harvest*—A good crop; say 30 to 32 cwt. per acre; clover and seed hay not so well secured as previous year; where threshed less seed, lighter weight, and dark-coloured; price of seed very much down. *Meadow-hay*—Very little grown; got in fair condition. *Potatoes*—A lighter crop, with more disease; 5 to 6 tons per acre; poor demand at very low prices. *Turnips*—Fair crop on dry land, wet sown land poor crop; average say 8 to 9 tons per acre, with a good deal "finger-and-toe"; wood-pigeons damaged young plants. *Insects*—Little damage. *Weeds*—About usual damage; runches and thistles plentiful. *Pastures* came early, and gave a good return during the season; owing to the wet summer lacked substance. *Live Stock* throve fairly well; sheep and lambs put on less flesh but grew to the usual size. Cattle much the same. Cattle free from disease; sheep troubled with foot-rot in the autumn to some extent, especially on soft land. *Clip of wool*—About the usual as to quantity and quality.

LANARKSHIRE (Upper Ward). *Wheat*—None grown. *Barley*—Only small quantities grown. *Oats*—25 to 40 bushels; moderate quality; less grain than last year; more straw; 4½ to 6 bushels sown per acre. *Harvest* started later than usual; not general till middle of September. Long harvest owing to broken weather. *Hay*—1½ to 2 tons per acre; more than last year, but not so well got. *Meadow-hay*—Good crop, but not well got. *Potatoes*—Much the same as last year—6 to 9 tons; some disease owing to so much wet weather; no new varieties planted. *Turnips*—20 to 30 tons; better than last year; brairded well; no resowing. Some finger-and-toe. *Weeds*—Damage much the same as usual. *Pastures*—Better than last year. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Good average quality.

LANARKSHIRE (Middle Ward). *Wheat*—30 to 40 bushels per acre; straw, 30 to 40 cwt.; seed sown, 4 bushels per acre. *Barley*—None grown. *Oats*—32 to 46 bushels per acre; straw, 25 to 35 cwt.; grub and wireworm prevalent in some districts; seed sown, 6 to 7 bushels per acre. *Harvest* was late; most of the crops were secured in fair condition. Labour was difficult to procure. *Hay*—Ryegrass and clover-hay were heavy crops, but there was great difficulty in securing the hay even in fair condition owing to the extremely wet season ; 30 to 40 cwt. per acre. Prices during August and September 1920, £7, 10s. to £9 per ton, but fell during winter and spring 1921 to £4 per ton. *Meadow-hay*—Timothy was a heavy crop, and would average 50 cwt. per acre. *Potatoes* turned out a fairly good crop, but owing to wet weather there was much disease in some varieties. Prices varied much according to quality, as the controlled price for potatoes discouraged the growing of those of finer quality. Prices ranged from £4 to £12 per ton, and the crop would average from 5 to 10 tons per acre according to nature of soil. *Turnips* were a good crop, but difficulty was experienced in sufficiently cleaning the heavier soils. Swedes sold in the autumn at £4 to £5 per ton, but in spring 1921 the price fell to 25s. per ton. The yield would be from 15 to 25 tons per acre. "Finger-and-toe" was very prevalent owing to the wet season. *Pastures* gave a plentiful return during the whole season. *Live Stock* were all healthy and high in price. Dairy cows from £45 to £65. Fat stock ranged from 70s. to 110s. per cwt. Cattle and sheep free from disease.

LANARKSHIRE (Lower Ward). *Wheat*—35 to 45 bushels ; quality good ; straw under average ; seed sown, 4 bushels per acre. *Barley*—None sown. *Oats*—Variable crop ; not well ripened ; bad weather and late finish. *Harvest*—Began about the usual time, with a late finish. *Hay*—An average crop ; variable weather for haymaking. *Meadow-hay*—None grown. *Potatoes*—Variable, and with disease, according to soil and variety. *Turnips*—Bad crop · complaints of finger-and-toe ; brairded badly ; much resowing. *Insects*—Less than usual. *Weeds*—Greater damage than usual. *Pastures*—Average growth and quality. *Live Stock* throve well. Cattle and sheep free from disease.

RENFREWSHIRE. *Wheat*—Quantity yielded, about 40 bushels ; quality not so good as last year ; straw up to usual weight, but quality not so good as usual ; seed sown, from 4 to 5 bushels. *Barley*—Very little grown. *Oats*—Average quantity, about 50 bushels ; quality inferior to that of last year ; straw fully as heavy as last year ; from 5 to 6 bushels sown. *Harvest* began later than last year and was a very troublesome, broken one, which accounted for grain being somewhat of inferior quality ; those in the later or higher districts of the county got better weather for finish than their earlier neighbours. *Hay*—Better than last year and quite up to average weight ; quality inferior on account of the broken and trying weather during the hay-making period. *Meadow-hay*—Heavy crop ; inferior quality owing to wet season. *Potatoes*—Yielded much the same as last year ; no disease ; few new varieties planted ; results quite good. *Turnips*—Average about 20 tons ; fully better than last year ; in some parts brairded very badly ; not grown to the same extent as formerly. *Insects*—No injury. *Weeds*—No injury on land under good cultivation ; much damage on badly-cultivated ground. *Pastures*—Average in quantity ; owing to the wet season and want of sun the quality was not so good. *Live Stock* throve fairly well, not so good as last season. Cattle and sheep free from disease. *Clip of wool*—Quite up to average in quality and weight.

ARGYLLSHIRE (Lochgilphead). *Wheat*—None grown. *Barley*—None grown. *Oats*—Not so heavy a crop as last year owing to cold, wet season. Lea oats about 6 bolls, and sown down land, 5½ ; straw about 15 cwt. ; seed sown, 6 bushels. *Harvest* began about usual time, 3rd September, a few days earlier than last year. *Hay*—Not so heavy as usual ; ryegrass not much over 1 ton, and not very well got. *Meadow-hay*—Not so bulky ;

about 1¼ tons, but rather better secured unless where very late. *Potatoes* not such a heavy crop; a good deal of disease; about 5½ tons on an average; no new varieties. *Turnips*—Crop very irregular. On some farms quite a good crop, up to 30 tons, and on others a complete failure, not more than 5, due to land being wrought too wet, and the continued rainfall through the summer. Crop brairded well; no second sowing. *Insects*—No injury. *Weeds* difficult to keep down. *Pastures*—Of quite average growth, but soft. *Live Stock* throve very well. Cattle and sheep healthy. *Clip of wool* very good, about an average.

ARGYLLSHIRE (Kintyre). *Wheat*—None grown. *Barley*—Not good; grain very light owing to wet, cold summer; from 30 to 40 bushels; about 4 bushels seed sown. *Oats*—Barely so good all over as last year; plenty of straw, but not threshing so well. *Harvest* about a fortnight behind the usual time. *Hay*—About the same quality and quantity as last year; fairly well got. *Meadow-hay*—Not so well got as last year, but quite a good crop. *Potatoes*—Poor crop compared with other years owing to late planting and wet weather during summer; 3 to 6 tons per acre. *Turnips*—Very poor crop; unless on dry ground no crop at all; some wet ground was never sown, and where sown, never thinned; best fields about 20 tons. *Insects*—No damage. *Weeds*—No injury, except turnips not properly cleaned. *Pastures*—Of average growth, but quality not so good as usual. *Live Stock* throve fairly well; sheep not so well as last year. Cattle and sheep free from disease. *Clip of wool*—Quite an average.

ARGYLLSHIRE (Islands of Islay, Jura, and Colonsay). *Wheat*—None grown. *Barley*—Practically none grown. *Oats*—The crop was under average, both in respect of grain and straw; bad harvest weather prevailed, but notwithstanding this the crop was fairly well got. *Harvest* about ten days after the usual time. *Hay*—The crop was a good one and similar to last year's in all respects. *Meadow-hay*—Similar to last year's. *Potatoes*—Poor crop; from 5 to 6½ tons per acre; no disease; no new varieties. *Turnips*—From 10 to 12 tons per acre. Crop brairded well, but, owing to a long spell of wet weather, weeds could not be kept down, and in many places overgrew and almost entirely spoiled the crop. *Insects*—No injury. *Weeds*—There was a general growth of weeds, owing to continued wet weather; abnormal damage was caused. *Pastures*—Average growth and quality with last year. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Good average clip in weight and quality.

STIRLING DISTRICT.

DUMBARTONSHIRE (Upper). *Wheat*—None grown. *Barley*—None grown. *Oats*—Only a moderate crop, but a little better than last year; straw not so bulky; grain about 36 bushels per acre; seed, 5 to 6 bushels, according to variety sown. *Harvest* began about a week after the usual time and was very troublesome, especially to those who were late. *Hay* was a good crop, about 1½ tons per acre, but the quality was badly spoiled by rain and in some cases by over-ripeness. *Meadow-hay* was a much better crop than last year, but was spoilt to some extent by wet weather after being cut. *Potatoes* were fully less bulky than last year, owing to the sunless summer; a little over 5 tons. *Turnips* were a moderate crop—about 17 tons to the acre; crop brairded well; no resowing. *Insects*—No damage by insects. *Weeds*, especially redshank, were troublesome among the turnips. *Pastures* were very good, came early and continued late, but were too watery most of the season. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Good for weight, fair quality, over the average.

DUMBARTONSHIRE (Lower). *Wheat*—About 34 bushels per acre; grain and straw fair; seed sown, 3½ to 4 bushels. *Barley*—Little or none grown. *Oats*—About 38 bushels; straw bulkier than last year, but not so well got; a large proportion of the grain more or less damaged by wet weather; good samples of seed grown in this district very scarce; seed sown, from 5 to 6 bushels, drilled a bushel less. *Harvest* began from two to three weeks later than usual. *Hay*—Heavier crop than last year; quality not nearly so good owing to wet weather; more clover than in 1919; from 30 to 32 cwt. *Meadow-hay*—Heavier than last year. *Potatoes*—From 4 to 7 tons according to variety, less weight of late varieties, and quality not so good as last year; some of the second earlies were pretty badly touched with disease; some new varieties did very well—viz., "Kerr's Pink" and "Arran Victory." *Turnips*—Less weight than last year; about 17 tons; quality not so good; brairded fairly well; little or no resowing. *Insects*—Very little damage done; less than usual. *Weeds*—Turnips in some places suffered from weeds owing to the wet season. "Redshank" and "spurry" among turnips. *Pastures*—Average growth, but quality not so good as last year. *Live Stock* throve fairly well; took longer to finish compared with last year. Cattle and sheep free from disease. *Clip of wool* good, and up to the average.

STIRLINGSHIRE (Western District). *Wheat*—None grown. *Barley*—None grown. *Oats*—38 to 40 bushels grain as compared with 42 bushels last year; straw, 22 cwt.; seed, 5 to 6 bushels. From lack of sunshine the crop did not ripen evenly, was not well filled, and in many instances had to be taken in a green state; suffered after being cut from exposure due to the extremely wet season. *Harvest* began 15th September (two weeks later than last year) and finished about 1st November. *Hay*—Ryegrass heavy crop; 2 tons per acre against 23 cwt. last year; not specially well got. Clover more plentiful than last year. *Meadow-hay*—Average crop; not too well secured. *Potatoes*—6 tons, being 1 ton below last year. Some varieties suffered from disease, which set in about August, to the extent of two-thirds of the crop. The new varieties planted were "Arran Comrades" and "Arran Victory." The former diseased badly, while the latter was a fair crop and free of disease. *Turnips*—20 to 25 tons, contrasted with 28 to 30 tons in previous year; fair quality; brairded rather slow, but very few cases of second sowing. *Insects*—No injury. *Weeds*—Some injury; more redshank than usual. *Pastures*—Above average. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Equal to average in quality and quantity.

STIRLINGSHIRE (Eastern District). *Wheat*—About 36 bushels per imperial acre; quality only fair; 35 cwt. of straw; seed, 4 bushels. *Barley*—32 bushels per imperial acre; quality not nearly so good as last year; seed, 4 bushels; 20 cwt. of straw. *Oats*—40 bushels per imperial acre; fair yield; 25 cwt. of straw; 6 bushels seed per acre. *Harvest* began about the usual time, but continued very long, owing to want of wind and sunshine. *Hay*—Good crop, but only fair quality, owing to bad weather. *Meadow-hay*—Good average crop. *Potatoes*—Average crop and yield. *Turnips*—Good crop—about 20 tons. *Insects*—No injury. *Weeds*—No damage. *Pastures*—Good season. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Average yield.

CLACKMANNANSHIRE. *Wheat*—Crop a fair average, and better than last year. Owing to wet weather it was rather difficult to secure in good order. Yield from 30 to 40 bushels per acre; 3 to 4 bushels sown. *Barley*—Crop not up to the average, and got damaged in the stook owing to wet weather during harvest. Average yield from 30 to 34 bushels per acre; from 3½ to 4 bushels sown. *Oats*—Not a full average crop, and damaged by rain in harvest; grain not the usual yield or quality; yield, 36 to 42 bushels per acre; 4 to 5 bushels sown. *Harvest* was about ten days later in beginning than last year, and was rather wet in late districts. *Hay*—Crop an average one in bulk, but, owing to wet weather, was difficult to secure in good condition; yield, 35 to 45 cwt. per acre. *Meadow-hay*—An average crop, more bulky than last year, and better quality. *Potatoes*—An average crop in bulk but not in quality; the want of sunshine in the summer months told against the crop; average yield, 4 to 6 tons per acre. *Turnips*—A better crop than last year, although perhaps not quite up to the average; yield from 8 to 12 tons per acre. *Insects*—Oats were a little damaged by grub, but not to any great extent. *Weeds*—Owing to the wet summer weeds were troublesome to keep down; worse than last year. *Pastures*—No want of grass all through the season. The grass was better than last year. *Live Stock* did well on the grass all the time. Cattle and sheep were free from disease. *Clip of wool*—A good clip; little better than last year.

PERTHSHIRE (Western District). *Wheat*—Straw and grain about an average; yield 36 bushels, seeding 3½ bushels. Area sown was larger than that of the previous year. Crop well secured. *Barley*—Larger area sown; straw short; yield about 32 bushels; of fair quality; seed 4 bushels per acre. *Oats*—Area sown was under the average; yield 36 to 38 bushels, seed 4½ to 5 bushels; straw average in bulk, but in many districts the quality was deficient. *Harvest* began from a week to ten days later than last year. In some districts the crop was damaged by broken weather. *Hay*—Quite an average crop, and generally well secured, unless in later districts. *Meadow-hay*—About an average. *Potatoes*—A full average crop; well secured. The acreage planted was less than that of the former year. Fairly free from disease. Several of the newer and immune varieties were planted, and while some of these gave a larger yield, this was more than counterbalanced by the fact that most of those varieties are of little value for domestic uses. *Turnips*—Over an average crop on most farms, but in some districts the damage by insects and crows was above the average; no second sowing. *Pastures* of average growth and quality with last year. *Live Stock*—Stock throve well on the grass, and left a considerable profit on the summer's grazing. Cattle and sheep free from disease. *Clip of wool*—Quality of wool was up to an average, but the quantity fell short of former years.

PERTH DISTRICT.

FIFESHIRE (Middle and Eastern District). *Wheat* would yield from 32 to 35 bushels per acre, of, in many cases, inferior quality, harvested under trying conditions; the usual seeding is from 3½ to 4 bushels per acre. *Barley* yielded from 36 to 40 bushels per acre, about one-third of which was secured in fair condition, but on many farms where the ripening was later was stacked in an unsatisfactory condition; seed sown from 3½ to 4 bushels per acre. *Oats* a good crop, averaging from 52 to 56 bushels per acre; stooked well, but much spoiled by rain; usual seeding from 4 to 6 bushels per acre according to variety. The *Harvest* generally about 14 days later than last year; reaping accomplished satisfactorily; after about one-third of the crop was secured the weather conditions prevented the remainder being stacked in good order. *Hay*—Average crop coiled in good order; yielding from 35 to 40 cwt. per acre of superior quality. *Meadow-hay*, where grown in this district, was a heavier crop than last year. *Potatoes*—Average yield, 6½ tons, although many farms averaged 8 tons per acre; during the ripening period some of the softer varieties showed disease to the extent of 25 per cent, and have kept very badly in the pits, making spring dressing very laborious. *Turnips*—Crop above the average; second sowings in some cases; early sown fields have turned out best. *Insects*—Some injury by wire-worm and grub; not to any appreciable extent. *Weeds* not so apparent this year, damage being negligible. *Pastures*, where stocked early and heavily, did not recover until the autumn; the quality otherwise was good. *Live Stock* in some cases reduced in numbers, but generally throve well. Very few cases of disease in cattle and sheep. *Clip of wool*—A good average in weight and quality.

FIFESHIRE (Western District). *Wheat*—Yield of grain less than last year; 36 bushels per acre on best wheat lands, with abundance of straw; seeding 3½ to 4 bushels; much of the crop secured in bad condition. *Barley* also lighter yield; 38 to 40 bushels per acre; weighed lighter to the bushel. Straw above the average; much of it secured in soft and bad condition; seeding 4 bushels as a general rule. *Oats* of various qualities yielded 48 to 56 bushels per acre. This crop was much damaged by weather in the later districts. Straw a heavy crop generally, but of varying quality; seeding 6 bushels. *Harvest* generally was from ten days to a fortnight late in starting, and the later part was broken by damp weather; much of the grain crop was stacked in bad condition. *Hay*—Clover hay an abundant crop of 2 tons and over, and secured in good order. *Meadow-hay*—Good crop, and above the average yield. *Potatoes* a large crop; average yield on best lands, 6 to 7 tons per acre; some cases of disease reported among the softer varieties and rot in the pits. *Turnips* an abundant crop; difficult to consume and clear the fields for ploughing, owing to shortage of stock; much of the crop was slow to braird, but came away with the autumn rains; few cases of resowing reported. *Insects*—No damage, except one or two cases of wire-worm in wheat. *Weeds* well kept in hand, owing to dry summer. *Pastures* carried their usual stocking, and were of good feeding quality. *Live Stock* throve well on pastures. Cattle and sheep free from disease. *Clip of wool*—A fair average.

PERTHSHIRE (Eastern District). *Wheat*—Good average crop where not thinned out by grub; yielded about 40 bushels per acre; seed, 3 to 4 bushels per acre. *Barley*—Average crop, much damaged by wet season; yielded about 40 bushels per acre; seed, 3 to 4 bushels per acre. *Oats*—Good crop; about half very much damaged by bad harvest; yielded about 50 bushels per acre; seed, 4 to 6 bushels per acre. *Harvest* began about a week later than last year. *Hay*—Very good crop, secured in excellent condition; yielded about 35 cwt. per acre. *Meadow-hay*—Very little grown. *Potatoes*—Very heavy crop; yielded 8 to 10 tons per acre; some disease in softer varieties. *Turnips*—Very good crop; about 25 tons per acre, and of excellent keeping quality. *Insects*—Many fields of wheat had either to be ploughed up or patched with barley and oats, owing to the ravages of the small grub or worm attacking the stem. *Weeds*—About the usual damage. *Pastures*—Fully an average. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Good quality; under average.

PERTHSHIRE (Central District). *Wheat*—Not a wheat-growing area. A few of the farmers, however, had a break of wheat. The crop was a fair one—from 32 to 36 bushels. As a rule 3 bushels were sown to the acre. *Barley*—The crop on the whole was good, and the acreage sown was above the usual. The yield would be from 35 to 36 bushels per acre, weighing from 52 to 56 lb. to the bushel. *Oats*—The acreage was very considerably less than that of last year. The yield was an average one—from 30 to 34 bushels to the acre. The straw was short, but the head of grain was fairly good; weight from 40 to 44 lb. per bushel. *Harvest* in the Central District commenced generally on 1st September. This is about the usual time in this district. *Hay* like the previous year was under the average generally. *Meadow-hay*—A fair crop was secured. Much better than last year on the high ground. *Potatoes*—On the whole heavier crop than last year—average from 8 to 12 tons per acre. There was a good deal of disease. *Turnips*—Crop was better than last year. Swedes on some of the farms were fair. The crop brairded very well, but after thinning the frost and the wet killed many of the young plants. *Pastures*—Grass was more plentiful, and the average quality good. *Live Stock* throve fairly well. Cattle and sheep free from disease. *Clip of wool*—About the average.

PERTHSHIRE (Highland District). *Wheat*—None sown in the district. *Barley*—Very little, if any, barley sown. *Oats*—An average crop throughout and good straw, but owing to the wet, late, and sunless season, the grain never ripened, and during the heavy rainfall for August and September much of the grain was very poor quality and the straw suffered; 42 bushels. *Harvest* was about three weeks later, about the 20th of September before there was general harvest, and at that date much of the oats was green. *Hay*—A fair average; 25 cwt.; all well secured and of good quality and good aftermath. *Meadow-hay*—A fair crop, but very late, and much remained unsecured or badly got owing to the wet weather, especially in the glens. *Potatoes*—Above the average of last year; more ware and less seconds; 8 tons; no signs of disease; many varieties planted. *Turnips*—A full average crop, but late in ripening, owing to so much moisture; quality very good; 20 tons; the crop brairded very well, and no second sowing required. *Insects*—No sign of insects, and no fly damage. *Weeds*—Fully more plentiful, causing much more work in hoeing; mostly rack and skellochs. *Pastures.*—Very good throughout the whole season, and early; season for grass above the average. *Live Stock*—All kinds of stock did well until August; after this date there was too much moisture, with cold nights, to enable them to fatten. Cattle and sheep—No sign of disease. *Clip of wool*—Quantity and quality under the average.

FORFARSHIRE (Western District). *Wheat*—36 bushels; some secured before the weather broke; grain and straw of quite average quality—a big proportion, however, spoiled; seed, 3 to 4 bushels. *Barley*—38 to 40 bushels; grain and straw of average quality, except grain and straw spoilt by bad weather; seed, 3 to 4 bushels. *Oats*—48 to 50 bushels; grain and straw of average quality, but a lot of oats very badly spoilt by bad weather, not even safe to give to stock. *Harvest*—Late, and much prolonged through weather conditions. *Hay*—Heavier crop than last year; say 35 cwt.; mostly got in fair order. *Meadow-hay*—Very little grown, but quite a good crop. *Potatoes*—This crop very much better than last season; say 8 tons; a good deal of disease in some of newer varieties, although none in some older kinds. *Turnips*—4 to 5 tons more than last season; say 20 tons; very little second sowing. *Insects*—No serious damage. *Weeds*—Usual display of "skellies," but otherwise not much to complain of. *Pastures*—Very much superior to last season. *Live Stock* throve very well. Cattle and sheep free from disease, but "grass sickness," as usual now in this district, carried off a lot of valuable Clydesdale horses. *Clip of wool*—A good average.

ABERDEEN DISTRICT.

FORFARSHIRE (Eastern District). *Wheat*—Grain crops in eastern Forfarshire were so badly damaged in the disastrous harvest of 1920 that any report of the yield of the crops may be taken as only approximate, it being impossible to give a correct estimate; probably 4 quarters; quality very poor; straw about 22 cwt.; seed, 4 bushels per acre. *Barley*—Almost wholly damaged, only a few fields being secured before the weather broke; yield, probably 4½ quarters, mostly feeding quality; seed sown, 3 bushels per acre; straw, 15 cwt. *Oats*, like barley, very badly damaged, both grain and straw; yield promised to be an excellent one, but possibly about 6 quarters per acre at the outside, and straw, say, 16 cwt.; the seed sown is 4 bushels per acre of the old varieties, and 6 bushels per acre of the new. *Harvest* commenced in excellent time and in fine weather, about 21st August, but after the first fortnight, when the weather broke, dragged miserably on, earlier places finishing about 13th October, and later about 1st November. *Hay*—2 tons per acre; good crop; much heavier than last year, but the quality considerably spoilt owing to bad weather in haymaking time. *Potatoes*—Fine crop; 8 to 9 tons per acre; good deal of disease, especially amongst the newer and "immune" varieties, most of these having been far from successful either in quality or yield as compared with the older varieties. *Turnips*—Excellent crop of fine quality, swedes being well over 20 tons per acre; brairded well; no resowing. *Insects*—No injury. *Weeds*—No damage. *Pastures*—Average growth and quality with last year. *Live Stock* throve well. Cattle and sheep free from disease. *Clip of wool*—Average; fair quality.

KINCARDINESHIRE. *Wheat*—A good crop and well harvested; 40 bushels per acre; seed, 3 or 4 bushels. *Barley*—Good crop; 40 bushels per acre; seed, 3 or 4 bushels. *Oats*—Medium crop, and well harvested; 40 bushels per acre; seed, 5 bushels. The general bulk over the county much above last year. *Harvest* began about the usual time and was very much prolonged. Not a great deal of damage owing to sprouting. *Hay*—Fair crop; yielded 30 cwt. per acre. Clover rather deficient. *Meadow-hay*—Almost none grown in this ward. *Potatoes*—Very good crop; no disease. A great superabundance in the county. *Turnips*—A good crop, one of the best of recent years; a perfect glut, most difficult to consume the whole crop. *Insects*—No injury. *Weeds*—No damage. *Pastures*—Quite good during the season. *Live Stock* throve quite well. Cattle and sheep free from disease. Some cases of sheep scab in the county. *Clip of wool*—Extra good; well over average. Cheviot wool sold very well. Blackfaced wool most difficult to sell.

ABERDEENSHIRE (Buchan District). *Wheat*—None grown. *Barley*—Quantity per acre, 4 quarters; quality of grain and straw destroyed by rain; seed sown per acre, 4 bushels. *Oats*—Quantity per acre, 5 quarters; quality of grain and straw destroyed by rain; seed sown per acre, 6½ bushels. *Harvest* began about usual time, first week in September. Harvest much delayed by continuous but not heavy rain. *Hay*—Quantity per acre, 2¼ tons; quality good. *Meadow-hay*—None grown. *Potatoes*—Quantity, 5½ to 6 tons; no disease; no new varieties. *Turnips*—Weight per acre, 15 to 18 tons; quality good; crop brairded well; no resowing. *Insects*—Less damage than usual. *Weeds*—Less injury than usual. *Pastures*—Very good; better than last year in quantity and quality. *Live Stock* throve very well. Cattle and sheep free from disease. *Clip of wool*—No sheep stocks in this district of any extent.

Aberdeenshire (Central District). *Wheat*—None grown. *Barley*—31 bushels per acre, same as last year; straw, 18 cwt. per acre, 1 cwt. less than last year; the quality of both grain and straw of what was harvested without being damaged by bad weather was similar to last year, weather-damaged grain and straw being very much inferior. Natural bushel weight of grain secured without weather damage, 55 lb.; weather-damaged grain ranged from 49 lb. to 54 lb.; seed, 3 to 3½ bushels per acre where drill-sowing machine used; 4 bushels where hand or broadcast-sowing machine used. *Oats*—37 bushels per acre; 5 bushels more than last year; straw, 16 cwt. per acre, 1 cwt. more than last year; the quality of both grain and straw of what was harvested without being damaged by bad weather was better than last year, weather-damaged grain and straw being very much inferior. Natural bushel weight of grain secured without weather damage ranging from 40 lb. to 45 lb., a large proportion being about 42 lb.; weather-damaged grain ranging from 34 lb. to 42 lb.; seed, potato oats and all thin-husked varieties, where drill-sowing machine used, 4½ to 5 bushels per acre; 6 to 6½ bushels where hand or broadcast-sowing machine used; all thick-husked varieties, 2 to 2½ bushels per acre extra. *Harvest* began at the usual time, but was very much protracted by bad weather. Bere and barley harvest commenced from 29th August to 6th September; oat harvest about 6th September. High wind on September 4th did a deal of damage to all cereal crops, estimated at from 2 bushels to 2 quarters per acre, according to exposure. Harvesting work was very slow, and only generally completed about the end of October, with late exceptions up to second week of November—generally from seven to ten days later than last year. *Hay*—24 cwt. per acre, 8 cwt. more than average of last year. The quality of the crop was quite as good as last year, and generally better mixed with clover, and, with a few exceptions, was secured in good condition. *Meadow-hay*—16 cwt. per acre—double of last year's crop. *Potatoes*—6 tons per acre—same as last year. No disease reported. Quality rather better than last year, and tubers much more uniform in size. No new varieties reported; "Arran Comrade," "Iron Duke," "Kerr's Pink," "Arran Chief," "Dalhousie," "Main Crop," "Fortyfold," were all planted as part of general field crop, "Ashleaf," "Duke of York," being the general favourites for early garden or plots. *Turnips*—15½ tons per acre, 1 ton less per acre than last year. Braird came up regular, no second sowing being reported; quality of crop equal to last year. *Insects*—No injury by insects to crops reported. *Weeds*—No injury to crops reported. *Pastures* during the season were more than average growth, and quality very much better than last year. *Live Stock* of all kinds throve well. Cattle and sheep free from disease. *Clip of wool*—Quite average in quality, slightly under average in quantity.

Aberdeenshire (Strathbogie District). *Barley*—This district being rather late, there is generally only a small acreage of barley grown, but the tempting prices of the past couple of years induced a larger sowing than in previous seasons. In most instances the ground was manured, with the result that on the whole the crop was quite satisfactory. Unfortunately only a small proportion was in the stackyard when the heavy rains commenced to fall, which continued for several weeks, and did a considerable amount of damage to the straw and discolouration of the grain. The quantity per acre might be stated as about 38 bushels, with a natural weight varying from 54 to 56 lb. per bushel. *Oats* upon good land were an average crop, but upon the poor hillside land the bulk of straw was far short of an average, consequently the yield of grain is deficient all over. None of the crop was cut and secured before the rain, with the result that considerable damage was done to both straw and grain. The quantity of seed used per acre was about six bushels of the older varieties of grain, and about eight of the newer thick-skinned sorts, of which a small area was grown upon the better class of soil. *Harvest* generally began about the usual time, but was greatly protracted on account of the drenching rains which commenced to fall at the beginning of the cutting period. *Hay* was generally a good crop, and being well mixed with clover made splendid feeding. The bulk per acre was at least double that of last season. Some farmers were fortunate in getting it well secured, others had difficulty, and the crop was somewhat spoiled for feeding. *Meadow-hay*—None grown. *Potatoes* were generally a bulky crop, indeed more than double the weight of last year. The quality was in many instances deteriorated by an unusually early frost which injured the haulms, and spoiled the ripening of the tubers, thus causing a larger proportion of smalls than there would have been in a normal season. *Turnips*—A good crop; in many instances up the way of 20 tons per acre on the best land in high manurial condition. The quality of the roots has been good, and at present, 1st April, they are still quite hard, although the leaves are, and have been all winter, quite green. The braird came all right and only one sowing was required. *Insects*—Fortunately there was no injury caused by weeds and insects. During the period of cleaning the land the weather was remarkably dry and favoured cleaning, so farmers with dirty land took advantage of the circumstances. *Pastures* were generally quite productive during the grazing season, with the result that stock did well on the grass. Animals being prepared for the early fat markets had to be housed upon the advent of the rains in the early part of harvest. Cattle and sheep free from disease. *Clip of wool*—The quality was quite up to the average, and the weight generally about average. At the present time many flock-owners have the clip on hand, not having received an offer for it.

BANFFSHIRE (Lower District). *Wheat*—Practically none grown. *Barley*—About 44 bushels per acre. Grain of excellent quality on early farms where carefully harvested; a good deal of bad grain on later farms due to heating. Seed sown, 4 bushels per acre on light land, and 5 bushels per acre on heavy land. *Oats*—About 48 bushels per acre, and 24 cwt. of straw. Quality of grain good where well harvested. Average crop. *Harvest*—Barley harvest began on 25th August, which was a week later than the previous year; oats began on 3rd September. All harvesting operations completed by the end of the first week in October, which was practically the same time as last year. *Hay*—30 cwt. per acre; about an average, and 10 cwt. per acre more than the previous year; quality excellent. *Meadow-hay*—Practically the same as last year—22 cwt. per acre; quality good. *Potatoes*—Yield about 10 tons per acre—double that of last year; quality good. No disease. The new varieties grown were "K. of K.," "Purple-Eyed Kidney No. 3," "Arran Comrade," and "Tinwald Perfection." These gave large yields; quality all that could be desired; no disease of any kind. *Turnips*—Quantity 25 tons per acre, as against 20 previous year. Quality excellent; no disease, and kept well during the winter. Crop brairded well. No second sowing. *Insects*—No injury. *Weeds*—No trouble from weeds, as the weather was very suitable for cleaning the ground. *Pastures* above average, and 30 per cent better than last year. *Live Stock* did well during the whole of the grazing season. Cattle and sheep free from disease. *Clip of wool*—Quality good; above average.

BANFFSHIRE (Upper District). *Wheat*—None grown. *Barley*—An increased area sown due to a greater demand for distillery purposes. The crop was a full one, but prices dropped suddenly by more than £2 per quarter. *Oats*—Full crop of straw, and a good return of grain, and in good early soils, fair weight per bushel. In the hilly districts, light weight, from 38 to 41 lb.; produce, from 3 to 6 quarters according to location. *Harvest* became general second and third weeks of September, and went well for about 2 weeks, when rainstorms came on and saturated the cut grain, interfering with the stacking and keeping of the grain, and much of it was thrown on the market at reduced prices. *Hay* crop of less breadth, as more acres were needed earlier for pasturage; due to the lack of fodder, cattle were sent afield earlier. An average crop per acre of good mixed quality. *Meadow-hay*—Meadows little cut in this region; pastured where the sown grasses fail from end of July as required. *Potatoes* planted for home consumption; abundant crop; seed used—"Up-to-Dates," "Edzell Blues," and "Northern Star." *Turnips*—Crops are variable; those sown end of May and first week in June prospered all right and bulbed well; later sowings came up very irregularly and much under an average; collectively, represent a fair average crop. *Insects*—No damage; later turnips damaged by fly. *Weeds* kept well down throughout owing to dry season. *Pastures* fair, owing to dry and rather cold summer weather. *Live Stock* did fairly well. Cattle and sheep free from disease. *Clip of wool*—Satisfactory in quantity, but many complaints over the reduction in price.

INVERNESS DISTRICT.

MORAYSHIRE. *Wheat*—Very little grown, but that of excellent quality; about 42 bushels per acre. *Barley*—About 37 bushels per acre, or 1 bushel more than last year; straw about 36 cwt., or 6 cwt. more than last year; weight of grain about 57 lb., or 1 lb. over standard; colour excellent; seed sown, 3 to 4 bushels. *Oats*—About 40 bushels, or 4 bushels more than last year; straw about 40 cwt., or 10 cwt. more than last year; quality of grain extra good; weight per bushel about 44 lb., or 2 lb. over standard; quality of straw good; seed sown, 5 to 8 bushels, according to variety. *Harvest* began a little later than usual, about the beginning of September. Less than usual lying grain, so that binders got more to do and worked quicker. Cutting took much less time than usual; the weather for leading was favourable, with result that in many cases discretion was overcome by impatience, and some heating of stacks occurred. *Hay*—About 30 cwt., or 2 cwt. more than last year; legumes more plentiful than last year; clover thick where sown; kidney vetch the predominant feature; secured in first-class order. *Meadow-hay*—Little grown; fully better than last year. *Potatoes*—About 6 tons, or same as last year; no appreciable disease. *Turnips*—About 22 tons, or 2 tons more than last year; quality good; some of the drier ground suffered from drought; braird came away well; not much second sowing. *Insects*

—No noticeable damage; rooks searching for insects pulled up a good few turnips on the heavier land. *Weeds*—None to complain of. *Pastures*—Much better than last year; especially so in the later months of the year. *Live Stock* throve better than last year. Cattle and sheep free from disease. *Clip of wool*—Average, both as to quality and quantity.

NAIRNSHIRE. *Wheat*—Only grown on two farms; 40 bushels per acre. *Barley*—30 bushels per acre; straw short; 4 bushels sown. Straw and grain rather under last year. *Oats*—32 bushels per acre; straw short; 5 to 7 bushels sown. *Harvest* began about the usual time. *Hay*—21 cwt. per acre; a light crop, wanting in clover. *Meadow-hay*—None cut in this county. *Potatoes*—A good crop, 6 tons per acre; no disease. *Turnips*—A good crop, 20 tons per acre; have kept better than last year. *Insects*—Not injurious to any great extent. *Weeds*—No injury. *Pastures*—Owing to drought pastures were much scorched. *Live Stock* throve fairly well. Cattle and sheep free from disease. *Clip of wool*—Barely an average clip.

INVERNESS-SHIRE (Inverness District). *Wheat*—Crop about 42 bushels per acre, or say about 2 bushels per acre over last year; quality good; weight per bushel, 60 lb.; straw, about 28 to 30 cwt. per acre; seed sown, 4 to 4½ bushels per acre. *Barley*—About 36 bushels per acre; weight per bushel, say 54 lb.; straw, 24 to 26 cwt. per acre; quality good; seed sown, 4 bushels per acre; harvest commenced about third week of August. *Oats*—Crop of about 42 bushels per acre; weight per bushel, say 42 lb.; straw, about 26 to 28 cwt per acre; seed sown, 4 to 8 bushels per acre, according to variety and high or low ground. *Harvest* commenced third week of August, about a week later than last year. *Hay*—Both quantity and quality good; average weight, about 24 cwt. per acre. *Meadow-hay*—Very little grown. *Potatoes*—Fine quality; no disease; crop of about 7 to 8 tons per acre. *Turnips* in many cases did not make a good start owing to drought, but finished up a good average crop; weight and quality good, about 20 tons per acre. *Insects*—No injury. *Weeds*—Owing to a good deal of cross cropping, many fields dirty, also shortage of labour now showing its bad effects. *Pastures*—Better than last year; quite up to an average season. *Live Stock*—Quite up to an average season. Cattle and sheep free from disease. *Clip of wool*—Quality good; about an average.

INVERNESS-SHIRE (Lochaber). *Wheat*—None grown. *Barley*—None grown. *Oats*—Grain and straw the same average as last year; 6 bushels sown per acre. *Harvest* began six days later than last year. *Hay*—Clover 10 cwt. per acre more than last year, quality good. *Meadow-hay* more productive than last year. *Potatoes*—8 cwt. per acre less than last year; no disease; no new varieties planted. *Turnips*—15 cwt. under the weight of last year; very stiff in coming; required two sowings on some farms because of dry weather. *Insects*—No injury. *Weeds*—Carron greater than last year. *Pastures*—Under the average. *Live Stock* did not thrive so well as last year. Cattle and sheep free from disease. *Clip of wool* over the average of last year.

ROSS-SHIRE (Dingwall and Munlochy). *Wheat*—Not so many acres sown; quality of grain and straw good; yield 4 to 5 qrs. per acre; seed sown, 3 to 4 bushels per acre. *Barley*—Quality of grain and straw good; yield from 24 to 40 bushels per acre; seed sown, 3½ to 4 bushels per acre; straw short, owing to dry season before harvest. *Oats*—Quality of grain and straw good; yield from 48 to 60 bushels per acre: seed sown, from 3½ to 6 bushels per acre, according to variety grown; straw also short owing to long dry weather before harvest. *Harvest* began about usual time, about 18th to 20th August. Bad weather made harvesting difficult, and damaged some grain. *Hay*—Quality good, quantity short; yield about 1½ tons per acre. *Meadow-hay*—None grown. *Potatoes*—Yield good, say 6 to 8 tons per acre; quality very fine; very little disease; no new varieties grown. *Turnips*—Weight of swedes, say 20 to 30 tons per acre; yellows, 15 to 20 tons per acre; crop brairded well in earlier sowings; later sowings slowly and irregularly owing to dry weather. Some second sowing owing to "fly," but more damage done by crows pulling up plants. *Insects*—No injury. *Weeds*—No damage done. *Pastures* good, but affected by dry weather. *Live Stock* throve very well. Cattle and sheep free from disease. *Clip of wool*—Quality good; rather above average.

CAITHNESS-SHIRE. *Wheat*—Guaranteed price did not tempt any to try the growing of wheat so far north; was tried more than a hundred years ago, and occasionally since in a small way, but oats suit Caithness better than wheat or even barley, as the straw of oats is esteemed for fodder. *Barley*—A good average crop of about 40 bushels per acre. *Oats*—Seed sown—drilled, from 3 to 4 bushels; broadcast, about 5 or 6 bushels, according to the soil; best sowing time first or second week of April for securing the maximum of grain and straw in the month of September—5 to 12 quarters. *Harvest* began about the usual time in September; the weather continued very favourable for the work of reaping and binding; fine sunshine induced some to stack rather soon with the risk of "heating"; yield and quality better by at least 10 per cent than in 1919, and the product in meal would be a fifth more; 5 quarters gave 6 bolls of 140 lb. *Hay* was affected by the drought, but there was a crop of nice clover hay, about 2 tons per acre. The aftermath or "foggage" did not keep long. *Meadow-hay* was short, but well cured; about 1½ tons in favourable places. *Potatoes* escaped disease altogether. This is a rare occurrence. The crop was above the average, 8 to 10 tons or more per acre; champion variety has gone back during the last 10 years. *Turnips*—Early sown came on well; later ones suffered very much from drought. The "back end" was favourable, and there was no check from frost; many had an overplus of roots; yield, 17 to 27 tons. *Insects*—Little or no damage done by grub. *Weeds*—"Thistles," "skellock," "runch," "spurrey," "coltsfoot," and some other floating or winged seeds were prevalent, notwithstanding spraying and other efforts to eradicate. *Pastures*—The dry months of summer told on the pastures in the autumn, and concentrated feeding was dear, and cake almost unprocurable. *Live Stock* throve well on the pastures, but many had to cart water from a distance. *Tuberculosis* shows itself in too many cases, though special care is taken to have it eliminated. *Anthrax* is becoming rarer, and "scab" in sheep has been effectually dealt with by systematic dipping. *Clip of wool* has been up to average, but price is now on the down grade.

ORKNEY. *Wheat*—None grown. *Barley*—Bere yield about 32 bushels per acre, weighing about 49 lb. per bushel. *Oats*—Part of the oats were sown about the middle of April, and the remainder, owing to wet weather, not until the second week of May. The summer was fine, and the harvest began about the middle of September, being at least a fortnight earlier than the harvest of previous year. Some oats were cut with a green shade, and stacked before being properly winnowed. This took heat, but the bulk of the crop was secured in good order. Straw was rather scarce, but the grain averaged about 32 bushels per acre, and weighed 40 lb. per bushel as compared with about 35 lb. per bushel the previous year. *Harvest* began at the usual time at the end of September. *Hay* was secured in good condition, and weighed about 19 cwt. per acre. *Potatoes* were a good crop; weight about 6½ tons per acre. *Turnips* were in parts blanky at first, but improved and turned out a fair good crop, weighing about 11½ tons per acre. *Insects*—No damage. *Weeds*—No damage. *Pastures* fair. *Live Stock* throve fairly well. Cattle and sheep free from disease. *Clip of wool*—About an average.

SHETLAND. *Wheat*—None grown. *Bere*—The approximate average yield of grain was 32 bushels per acre. The bere crop was heavier than in the previous year, and the yield of straw was good in most districts. Most of the crop was secured in good condition. The estimated yield for the county was 3480 quarters. *Oats*—About 33 bushels per acre was found to be the average yield. A considerable quantity of the Shetland native oat is still grown in the poorer districts. The oat crop was generally of a superior quality than was the case last yield, with a fair yield of straw, and in most cases a bigger yield of grain. The estimated yield for the county was 28,200 quarters. *Harvest* was, as a rule, about a week earlier than the average. *Hay*—Ryegrass was a very good crop last year; estimated that the average yield per acre was 33 cwt. Some yields as high as 83 cwt. per acre were recorded. All the hay was secured in excellent condition. Compared with the previous year the yield was higher. *Meadow-hay* did better than in the previous year, owing to the dry weather experienced throughout the summer. The estimated yield per acre in this case was about 20 cwt. *Potatoes*—Estimated yield per acre was about 9 tons; much better than the previous year; very little disease occurred, although certain localities suffered from rot immediately after harvesting. A number of the newer varieties were planted, but although giving fairly high yields they were generally of poor quality. No outstanding variety suitable for local conditions has yet been found among the newer varieties. Estimated total yield 21,000 tons. *Turnips* as a rule did fairly well, although finger-and-toe disease was fairly prevalent in some localities. The estimated average yield per acre was 16 tons. Turnips were generally of good quality, although quite a lot of rotting took place in the pits during the winter. Owing to dry weather, &c., at time of sowing the braird was uneven, and two sowings had in some cases to be given. Estimated total yield 15,000 tons. *Insects*—Very little damage was reported, and in this respect plants were much freer than in the previous year. *Weeds*—With the exception of the damage done by charlock, weeds were no more troublesome than in an average year. *Pastures*—As a rule pastures, especially low-lying wet parts, did much better than in the previous year; and on the whole grass came early, did well during the summer, and held well into the early winter. *Live Stock* did very well, and were in good condition at the end of the season. No disease either in cattle or sheep. *Clip of wool*—Quality very good; about an average.

THE WEATHER OF SCOTLAND IN 1920.

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THIS report consists of (1) a general description of the weather over the Scottish area from month to month; (2) a selection of rainfall returns, in which each county in Scotland is represented by one or more stations. It is to be noted that all the temperature readings referred to are, unless otherwise stated, from thermometers exposed in the regulation "Stevenson Screen."

JANUARY.

Great cold in November 1919—the month was the coldest November experienced in Scotland for at least sixty years—had been followed by a generally mild December; and the first three months of 1920 were, for the most part, mild, with an unusual preponderance of south-westerly winds. The year did, indeed, open with ten days of rather cold weather; but round the middle of January decidedly mild, and later fairly mild, conditions prevailed. The extremes of the month were 58° at Leith on 17th and 14° at Braemar on 3rd.

Towards the north-east rainfall was below the normal, and in east and north-east there were many fine days; but over the greater part of Scotland there was a very decided excess, and at some places in the west there was rain on every day from 5th onwards. In parts, at any rate, of the West Highlands there was more rain than had fallen in November and December together. At Fort William (15·86 in.) a fall of 3·71 in. on 16th was the heaviest of the year, and considerably more than twice the rainfall at Gordon Castle for the whole of January. In England and Wales and in Ireland the month was a very wet one.

The weather was at times very stormy, especially during the first week, from 15th to 17th, and during the last few days. Heavy rains caused flooding at times, with landslides in Glenmore on 17th. For midwinter, snow was comparatively unimportant.

Thunderstorms occurred sporadically on several days, and rather widely on afternoon of 31st, with a very squally wind and hail.

Sunshine was, on the whole, above the average, short sunny periods alternating with longer cloudy ones.

February.

Until 18th there was an almost unbroken continuance of the mild Atlantic type of weather, which had been so much in evidence for the past few weeks, and a brief incursion of cold north-easterly winds from 18th to 20th was followed by a fairly speedy recovery and some unusually high day temperatures. The extremes were 62° at Smeaton and 61° at Leith—the highest readings recorded in Scotland in February since 1897,—and 21° at West Linton on 21st and at Eskdalemuir on 28th.

The distribution of rainfall for the month was very remarkable. Towards the north-east there was a well-defined area of deficiency, and Aberdeen had hardly more than 1 in. for the entire month, or only about half the normal rainfall for February. In the West Highlands, on the other hand, the month appears to have been the wettest February on record, wetter even than the notorious February of 1903; in the west generally there was a large excess, and in southern districts unimportant variations. At Kinlochquoich the rainfall for the month was no less than 27·44 in., with about 3 in. on 8th and 6·28 in. on 9th. Heavy falls occurred in the Clyde area on 9th—nearly 3 in. at Greenock; but the periods from 4th to 7th and 19th to 24th were fine, even in the West Highlands, and at Aberdeen there were only three days with falls of as much as one-tenth of an inch.

The first half of the month was stormy, and flooding occurred in many districts. There was some snow; but the most important snowstorm, on 18th and 19th, was confined chiefly to the southern counties.

A few very sunny days rather more than compensated for many cloudy ones.

March.

Except from about 6th to 10th, when northerly winds and wintry conditions were in evidence, and around 14th, south-westerly winds and mild weather again prevailed. The mean temperature of the month was higher than in any March since 1912, and the unusual mildness of the nights was noteworthy. The extremes were 63° at Crathes on 22nd, and 19° at Leadhills on 9th; but in the west, Glasgow and Greenock did not rise above 51°.

The generally mild character of the month was once again associated with a rainfall above the average over a great part of Scotland, England, and Ireland. Here and there in Scotland east and north-east there was a deficiency; but at, *e.g.*, Braemar and Rothesay, the excess was as much as 50 per cent, and at Glenquoich 60 per cent. In parts of the West Highlands amounts were less than in 1913; but at Glenquoich (15·76 in.) a wetter March has occurred during the last fifty years only in 1903. Until 19th conditions were unsettled towards north-west, with considerable fine to fair spells elsewhere; but from 23rd onwards rain was general, with some heavy falls over wide areas on 26th and 27th.

The weather was stormy at times. Snow fell rather heavily in some districts from 6th to 8th, and somewhat more generally around 14th.

Thunderstorms occurred rather widely on 26th, and here and there on 23rd or 31st.

There were a few rather sunny days, but except towards the north-east the month ranks as somewhat cloudy. Fog was in evidence during the last day or two.

APRIL.

The prolonged spell of weather of the south-westerly type which had persisted, with comparatively unimportant interruptions, for the preceding four months, came to an end early in April, and during the month there were frequent winds from the north-west and but few warm days. The nights, however, were cloudy and rather mild, and the mean daily range of temperature was the lowest on record for April. The extremes were 63° at Crathes on 24th, and 22° at Eskdalemuir on 8th.

Towards west and north-west, after a prolonged spell of generally wet weather, rainfall aggregates were decidedly deficient; whilst elsewhere there was a fairly well-defined though moderate excess. Rain was general in the east during the first few days, and towards the middle of the month conditions were generally unsettled. Much wetter weather prevailed over the South of England than anywhere in Scotland, and London had more rain during the month than fell anywhere in the West Highlands.

There was some snow and hail around 9th and during the last few days. Thunderstorms occurred here and there on 5th and 20th, and in the Lothians on the afternoon of 27th.

The month was decidedly cloudy; but there were sunny spells in the second week and during the last few days.

MAY.

Temperature conditions varied considerably; the beginning of the month was distinctly cold; and there were no really warm days until the fourth week. At a few places in the

West of Scotland, and over considerable areas in both England and Ireland, the highest temperatures of the year occurred on 24th or 25th. The general mildness of the nights was again noteworthy, and the mean daily range of temperature was again very low. The extremes were 79° at Turnberry and Colmonell on 25th, and 22° at Eskdalemuir on 1st.

Rainfall was below or just equal to the normal in the Spey Valley and along the southern fringe of the Moray Firth. Elsewhere there was an excess, moderate in the east to the south of the Tay, but very large in Orkney and in west and south. In Bute the month was the wettest May for at least 120 years; and at, *e.g.*, Aberdeen and Cargen, near Dumfries, a wetter May has occurred during the last fifty years only in 1906. There were in all districts several very wet days, especially 1st, 5th, 21st in west and 27th in east. On 27th Aberdeen had as much as 1·40 in., or fully one-third of the month's rainfall, and considerably more than twice the total for the dry month of May 1919.

A gale was general on 13th.

Thunderstorms occurred at scattered points on several days.

In the west the month was, on the whole, cloudy, though there were a few very sunny days. In the east there was fog and mist from 26th to 29th, but at other times a fair amount of sunshine.

JUNE.

During the earlier part of the month the weather was cold or rather so; but during the third week sunny and warm conditions prevailed, and over wide areas of Scotland the 17th, 18th, or 19th was the warmest day of the year. The extremes were 81° at Ruthwell on 17th and at Nairn on 18th, and 27° at Braemar on 5th—an unusually wide range of temperature for June.

Except here and there towards the south-west rainfall was below the normal, notably so in some eastern and northern districts, and at Grantown-on-Spey (0·51 in.) a smaller rainfall has been recorded in June only in 1887 and 1889. The most general rain occurred on 27th; over a great part of Scotland there was no rain of importance until 18th; and in the driest areas nearly the whole of the month's total was accounted for on one or two days.

Thunderstorms occurred somewhat widely on 18th, and towards west and south on 12th, 13th, or 17th.

The month was very sunny, especially towards the north. In Orkney it was the sunniest June for at least forty years; but more than half the total sunshine was accounted for from 12th to 19th, which was everywhere a brilliant period.

JULY.

Practically throughout, the month was dull, wet, and cold. The days especially were very cold for midsummer; at only two or three places did the thermometer reach 70° on any day; and only once during the last sixty years in Scotland has a colder July been experienced—in 1888. With nights that were cloudy and more nearly approached an average temperature, the mean daily range was notably low. The extremes were 72° at Paisley on 4th and 5th, and 30° at Braemar on 7th; and during each of the last sixty years some higher reading than 72° has been recorded somewhere in Scotland in the month of July.

The distribution of rainfall was somewhat variable, with a shortage in the extreme north and here and there in the east; but in general an excess, amounting in Edinburgh to about 50 per cent. In the wetter areas rain was frequent rather than very heavy; but on one or two days, especially on 26th in the west, there were intense falls of short duration during thunderstorms. At Leith on 2nd there was fully 1·5 in. or more than fell during the whole of June. In England and Wales and in Ireland the month was a very wet one.

Thunderstorms occurred towards south-east on 2nd and 18th, rather widely on 8th and 9th; in Orkney on 15th; and in west and south on 26th.

Except in the far north, the month was a very cloudy one.

AUGUST.

As in July, there was an almost complete absence of seasonable warmth, and fairly high temperatures on 16th were followed by a rapid fall with a return of the wind to the north-west. The month was the coldest August since 1912; and a remarkable feature of the summer of 1920 was the singular uniformity of temperature conditions throughout June, July, and August, each of which had at many places practically the same mean value. The extremes were 76° at Crathes on 16th, and 31° at Braemar on 26th.

The month was notable for two rainstorms: (1) On 8th, when disastrous flooding occurred in the Lothians and towards the Borders as a result of extremely heavy downpours within a short period—at Cockburn Hill, on the Pentland Hills, near Balerno, as much as 2·15 in. within 3 hours. (2) On 17th-18th along the Forth-Clyde belt, with 3·78 in. at Cockburn Hill; at Paisley 3·20 in., almost uniformly distributed over 9 hours from 1 P.M. to 10 P.M. on 17th; and 2-3 in. over considerable areas. But there was much dry weather, especially from 19th to 30th. Rain, however, fell more or less generally from 1st to 5th, and in north-west on 16th. In most areas outside the Forth-Clyde belt, rainfall was below the average, and greatly below in the far north and north-west.

Thunderstorms occurred locally on 2nd, 3rd, and 9th. Disastrous flooding occurred towards south-east on 17th-18th, as well as on 8th and 9th.

The month was, on the whole, somewhat cloudy.

SEPTEMBER.

Except for one or two fairly warm days during the second week, cold or very cold conditions prevailed until 22nd, when a remarkable change set in with a spell of warm days and unusually mild nights lasting well into October. The extremes were 72° at Smeaton and Kelso on 28th, and 27° at Braemar on 22nd.

Rain was more or less general during the first three days; there were heavy falls in north and west on 9th ; and very unsettled conditions from 14th to 18th were followed by a spell of fine weather. The heaviest falls of the month occurred towards the north on 17th and 18th, especially in Banffshire, Morayshire, and parts of Aberdeenshire. Thus on 18th there were falls of 2·31 in. at Aberlour and 1·75 in. at Gordon Castle and Fyvie Castle, each of them much more than the rainfall of the entire month at, *e.g.*, Crieff or Edinburgh. In the aggregate, except in the Moray Firth area and some isolated districts, there was a fairly well-defined deficiency, and Crieff had only half the normal.

Thunderstorms occurred at one or two points on 14th or 16th, and somewhat widely on 18th.

Sunshine amounts varied—above the average at Edinburgh, but considerably below it at Aberdeen.

OCTOBER.

The month was, on the whole, the mildest October since 1914 ; the mildness of the nights, especially during the first week, was striking; and only around 19th and during the last few days were they cold; and a very low mean daily range was notable as in some earlier months of the year. Indeed, in no other October during the last fifty years has there been such a moderate difference between the temperature by day and that by night. The extremes were 71° at Inverness on 4th and at Kilmarnock on 9th, and 19° at Braemar on 26th.

Very disturbed conditions during the first few days, with very heavy rains in some hilly districts, especially towards north-east, were followed by a prolonged fine spell until 30th, when there were heavy rains in south-west and west. Towards the north-west and north the month was notably dry—at Glencarron (1·32 in.) the driest October on record; and over much the greater part of Scotland amounts were deficient, or decidedly so. In the extreme south-west and in the hilly regions of Aberdeenshire, Kincardineshire, and Forfarshire, there was a decided excess. Braemar had nearly 4·5 in. between 1st and 5th, and Gruline (Mull) as much as 3 in. within 12 hours on 30th.

Gales were experienced during the first three or four days, and on 30th and 31st. Thunderstorms in west on 4th.

Disastrous flooding occurred in many districts early in the month, and in parts of Aberdeenshire the rivers are reported to have risen to as high a level as in the historic "Moray Floods" of August 1829. These floods, however, affected a much wider area, as did those of September 1915.

During the last week of the month dense fog visited the Forth and Clyde areas, whilst towards the north brilliant sunshine was experienced at that time.

NOVEMBER.

The month was in extraordinary contrast with the abnormally cold November of 1919. The only real cold occurred between 22nd and 24th; it was the mildest November since 1899; night readings were at times very high, and there was once more an unusually small mean daily range, the lowest on record for November. The extremes were 63° at Ardtornish on 15th, and 15° at Balmoral on 24th. In England, and especially in the south-eastern counties, conditions were very different; temperature was much lower than in Scotland, especially during the first week; and Kew Observatory (Richmond) had ground frost on sixteen nights as compared with three nights at Edinburgh.

In eastern and southern districts rainfall was below the normal, and at, *e.g.*, Edinburgh the greater part of the month's very moderate total was accounted for between 12th and 15th, when very wet weather was general. In west and north, on the other hand, there was a slight to moderate excess, and in some districts rain fell on every day from 4th to 19th. After 15th in east, and after 19th in west, almost rainless weather was general until 25th or 26th, when conditions again became unsettled.

Exceptionally stormy weather prevailed from 12th to 15th; in many districts numerous trees were uprooted; and in some much structural damage was done. The gale appears to have reached its greatest violence in the Northern and Western Islands.

There was some thunder and hail from 13th to 15th.

The month was in general somewhat cloudy, with dense fog in the Forth and Clyde areas on 22nd and 23rd.

DECEMBER.

After mild weather during the first three or four days, there was a fairly steady fall of temperature until 24th, but the cold was not in Scotland specially severe for the time of year, and unusually mild conditions prevailed during the closing week of the month. In many parts of Scotland the mean temperature differed little from the average. The extremes were 56° at Fort William on 25th and 26th, and 11° at Fort William on 18th and at Braemar on 23rd.

There was much fair or fine weather, and from 4th to 19th various places had hardly any precipitation, though there was rain in west and south on 8th or 9th, and rain, snow, or sleet widely around 12th. Conditions during the first three days and towards the end of the month were very unsettled; very heavy falls occurred in west on 1st, in north-east on 3rd, and in south on 29th. In eastern districts there was in general a slight to decided excess; but the Moray Firth area had a very small rainfall, and in west and north generally there was a shortage.

Wind reached gale force on 3rd and 4th and around 21st, and the weather was somewhat wintry around 12th and 18th, with some snow or sleet. Scotland, however, escaped any general snowstorm such as visited England and Ireland.

There was fog at times, in the Glasgow area more particularly on 6th and 18th. The month was decidedly cloudy in the north.

General Note.

The outstanding features of 1920 were the mildness of the January-March period, the almost complete absence of seasonable warmth in July and August, the great mildness of November, and the wide range of rainfall conditions relatively to the normal. Towards north-east and north the year was a dry one, whilst in west and south aggregates were above the normal. At the places represented in the accompanying table, taking a normal rainfall as 100 per cent, the totals for the year represent at, *e.g.*, Fort William, 120; Rothesay, 128: but Gordon Castle, 81 per cent of the normal.

RAINFALL RECORDS FOR 1920 IN INCHES.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Shetland—Lerwick	5·42	5·82	6·01	1·98	2·06	·75	3·45	1·26	2·33	·42	5·04	3·61	39·85
Orkney—Kirkwall	5·07	4·67	4·00	1·84	3·59	·51	2·66	1·23	3·15	1·11	5·86	4·00	37·69
Caithness—Wick	3·34	2·37	3·17	2·00	2·86	·78	1·89	·95	2·44	·62	3·83	2·39	26·14
Sutherland—Tongue	3·66	4·68	2·41	3·10	2·15	1·32	2·16	2·43	3·85	·78	4·08	2·24	32·86
Dunrobin	2·81	2·25	3·21	2·31	2·97	·65	1·50	·82	3·01	·90	2·84	2·08	24·85
Dornoch	2·41	1·61	1·64	1·84	2·29	·65	2·06	2·19	2·89	1·66	2·25	2·28	23·27
Ross and Cromarty—													
Fortrose	2·35	3·11	2·17	1·78	1·48	·36	2·89	2·08	2·03	·72	·83	·85	20·65
Ardross Castle	5·81	4·91	2·80	2·80	2·92	·54	2·29	2·36	2·68	1·86	4·56	3·33	36·86
Glencarron	12·27	15·60	10·31	5·16	5·72	2·34	6·12	3·77	4·90	1·32	8·41	7·01	82·33
Stornoway	8·78	7·44	5·02	2·96	5·21	1·52	2·76	2·24	4·26	2·66	8·54	5·00	56·39
Inverness—Inverness	3·29	3·41	1·96	1·47	1·40	·55	2·18	3·03	2·77	·56	2·28	·84	24·59
Rothiemurchus	4·00	4·80	3·16	2·03	1·77	·70	3·23	3·10	1·28	1·85	3·48	1·63	30·98
Kinlochquoich	22·25	27·44	20·58	6·84	12·69	4·12	9·50	6·47	7·45	4·24	14·40	9·33	144·81
Fort William	15·86	19·11	9·84	3·15	6·70	3·28	6·20	5·75	4·76	3·02	9·65	6·57	93·89
Nairn—Nairn (Delnies)	2·62	2·10	2·01	1·49	1·82	·64	2·20	2·41	2·91	·52	1·53	1·12	20·87
Elgin—Gordon Castle	1·55	1·74	2·86	1·80	2·14	1·33	2·70	2·30	3·10	1·42	1·80	1·32	24·06
Grantown	2·47	2·28	2·32	2·48	1·58	·51	3·33	2·92	2·56	1·30	2·11	1·63	25·49
Banff—Banff	1·37	1·35	2·45	1·99	2·24	1·15	1·98	2·28	2·84	1·69	1·51	1·50	22·35
Aberdeen—Fyvie Castle	2·21	·99	2·20	2·26	3·31	·45	2·77	2·17	2·99	4·02	1·34	2·70	27·41
Peterhead (Mains of Buthlaw)	1·78	1·27	3·25	2·33	3·60	·43	2·56	2·46	2·63	1·34	1·53	3·20	26·38
Aberdeen (King's Coll.)	1·32	1·02	2·73	2·12	4·10	·79	3·51	1·98	1·72	2·85	1·63	3·62	27·39
Balmoral	3·69	2·07	3·61	2·72	2·57	·47	2·77	3·44	2·29	4·64	2·57	3·86	34·70
Kincardine—Fettercairn	2·61	1·73	2·61	2·67	3·72	·95	2·94	4·04	1·69	4·60	2·60	4·30	34·66
Forfar—Montrose (Burgh)	1·33	1·00	1·53	2·85	3·00	·54	3·29	2·88	1·77	2·18	2·02	3·31	25·20
Dundee (E. Necropolis)	2·64	1·81	2·11	1·76	3·17	1·09	2·11	4·22	2·79	2·26	2·40	3·31	29·67
Forfar	3·14	1·84	2·28	1·95	3·68	1·05	3·15	2·97	1·68	3·74	2·48	4·47	32·43
Lednathie	5·79	3·74	4·58	2·79	5·37	1·92	2·81	3·95	2·44	7·31	4·68	6·70	52·08
Perth—Bonskeid	4·53	3·70	3·48	1·69	3·05	·80	2·14	3·92	1·86	4·91	4·75	4·23	39·01
Perth	3·45	2·94	2·14	2·03	2·87	·97	2·26	3·41	1·27	1·95	2·55	3·36	29·20
Crieff	4·56	4·40	3·56	1·77	3·90	1·83	3·46	5·38	1·43	2·37	5·00	5·68	43·34
Stronvar	11·83	15·50	8·75	2·82	7·92	2·15	4·98	5·27	3·59	5·41	9·50	7·07	84·79
Aberfoyle	8·35	9·80	5·00	2·05	6·00	2·15	4·20	6·15	3·60	2·75	7·00	5·20	62·25
Fife—St Andrews	2·51	1·68	1·64	1·78	2·79	·65	2·13	3·41	1·77	2·28	2·43	3·90	26.97
Kinross—Loch Leven	3·91	3·49	2·74	2·04	3·62	1·39	1·97	4·44	1·42	1·68	2·88	3·43	33·01
Clackmannan—													
Alloa Waterworks	4·25	3·85	2·40	1·85	2·98	1·80	3·80	5·23	2·07	1·48	3·69	4·20	37·60
Argyll—Gruline (Mull)	9·54	9·32	8·80	2·85	8·93	3·42	5·44	4·79	6·02	8·04	8·77	9·81	85·73
Oban	8·14	8·23	5·21	2·33	5·44	3·01	3·35	3·66	3·50	3·54	7·96	4·70	59·07
Glenorchy Manse	14·49	13·11	9·44	3·11	9·33	4·19	5·51	7·02	4·51	4·31	11·24	6·68	92·94
Ardrishaig	9·00	9·85	5·74	2·83	5·43	3·09	3·66	6·53	4·88	5·16	8·28	5·88	70·33
Campbeltown	6·45	4·52	4·05	3·26	7·66	2·83	3·59	5·01	4·77	5·20	5·36	5·95	58·65
Bute—Rothesay	6·64	6·20	5·54	3·32	6·97	3·36	4·46	5·34	4·08	4·29	7·29	5·16	62·65
Stirling—Stirling	5·74	6·88	3·36	1·52	3·83	1·62	3·30	4·66	1·43	1·43	4·77	4·13	42·67
Kilsyth	7·77	7·85	5·57	3·14	6·52	1·98	5·23	5·79	4·27	2·22	5·72	4·90	60·96
Dumbarton—													
Helensburgh	8·48	8·30	5·20	2·25	6·10	2·40	4·14	6·26	3·69	3·27	6·22	4·61	61·18
Renfrew—Greenock	9·64	11·09	7·01	2·50	7·08	2·75	4·61	6·56	4·05	3·72	6·96	6·14	72·11
Paisley	6·05	7·29	4·55	1·42	4·98	2·23	4·08	5·85	2·49	1·42	4·74	5·09	50·14
Ayr—													
Kilmarnock (Agric. Coll.)	5·33	4·54	3·97	1·59	4·89	3·48	3·13	5·89	2·64	1·49	3·49	3·46	43·90
Knockdon	5·56	6·20	4·44	1·89	5·78	2·62	4·48	4·11	2·58	2·00	2·51	2·96	45·08
Colmonell (Knockdolian)	5·92	3·70	4·28	2·67	3·33	3·09	3·80	4·33	2·41	6·08	3·61	5·45	48·62
Barr (The Manse)	6·33	4·45	5·54	3·30	5·96	1·96	3·61	4·35	3·42	3·88	3·29	4·49	50·58
Lanark—													
Glasgow (Observatory)	5·13	5·27	3·56	1·98	4·52	2·33	3·41	5·49	2·64	1·73	3·91	3·91	43·88
Lanark (Cleghorn)	5·15	4·46	3·96	2·36	4·58	1·59	3·84	4·47	2·96	1·41	3·05	2·76	40·59
Dungavel	9·38	8·42	6·70	3·32	7·54	2·40	5·59	7·36	2·61	2·35	5·08	4·75	65·50
Leadhills	13·90	7·41	10·13	4·45	6·72	2·63	6·12	6·22	5·58	3·00	4·38	7·38	77·92
Linlithgow—Bangour	3·32	3·24	2·97	1·81	3·25	1·25	3·96	5·91	1·63	·85	2·33	2·35	32·87
Mid-Lothian—													
Edinburgh (University)	2·35	2·84	2·23	1·86	2·28	·99	4·37	5·55	1·64	·84	1·65	2·27	28·87
Balerno (Cockburn Hill)	4·42	4·09	3·66	3·25	3·22	1·52	3·25	8·89	1·63	·95	3·07	3·93	41·88
Haddington—													
Gullane	2·07	1·66	1·76	1·45	2·71	·74	2·50	3·87	1·28	·97	1·35	2·17	22·53
Stobshiels Reservoir	1·85	1·36	2·15	2·59	2·51	1·18	3·57	5·12	1·15	2·08	1·81	3·01	28·38
Berwick—Marchmont	2·57	2·26	3·71	2·22	3·14	·72	4·07	3·56	1·82	2·27	1·88	4·48	32·70
Peebles—Glen	5·65	4·61	5·56	2·85	4·72	2·10	4·05	4·56	1·40	2·30	3·60	4·44	45·84
Selkirk — Selkirk (The Hangingshaw)	3·60	2·47	4·52	2·68	3·46	1·05	2·49	3·14	1·79	2·37	2·62	4·83	35·02
Roxburgh—													
St Boswells (Fens)	2·22	2·19	2·90	1·88	2·51	1·05	2·99	3·32	1·45	1·41	1·41	2·69	26·02
Branxholme	4·37	3·34	4·45	2·21	3·78	1·29	4·39	3·30	1·44	1·91	2·17	3·35	36·00
Dumfries—Dumfries	5·36	3·24	4·28	2·45	4·36	1·53	3·67	3·11	1·98	2·48	2·08	4·36	38·90
Drumlanrig	7·90	4·84	5·68	2·83	5·17	2·02	3·78	3·88	4·09	2·66	3·32	4·74	50·91
Beattock (Craigielands)	8·52	6·50	6·06	3·95	6·52	1·56	5·07	5·43	2·30	2·00	4·05	5·67	57·63
Langholm	7·06	5·45	6·41	3·71	6·26	2·08	6·60	5·33	2·30	2·54	4·20	6·41	58·35
Kirkcudbright—Cargen	7·28	4·83	6·11	3·32	5·62	1·73	4·37	4·02	2·62	3·29	2·78	6·15	52·12
Dalbeattie (Kirkennan)	6·28	3·79	5·44	3·16	6·08	2·02	4·28	3·79	3·26	2·21	2·14	5·55	47·95
Carsphairn (Shiel)	11·52	7·84	8·38	5·00	9·14	2·85	6·71	5·31	4·14	5·27	6·31	7·88	80·25
Wigtown—Ardwell H'se	5·02	2·58	3·49	2·95	4·82	3·60	3·91	3·40	3·48	5·12	3·02	4·68	45·52

AGRICULTURAL STATISTICS.—RETURNED UPON 4TH JUNE 1920—(*Compiled from the Government Returns*).

TABLE No. 1.—ACREAGE UNDER CROPS AND GRASS IN EACH COUNTY OF SCOTLAND.

COUNTIES.	Total Acreage under Crops and Grass.	Arable Land.	Permanent Grass.	Corn Crops.								Potatoes.	Turnips and Swedes.	Mangels.	Cabbage.	Rape.	Vetches or Tares (Seed).	Vetches, Tares, Beans, Mashlum, &c. (Fodder).	Small Fruit.	Rye-grasses and other Rotation Grasses and Clover.	Other crops.	Bare Fallow.
				Wheat.	Barley including Bere.	Oats.	Mixed Grain.	Rye.	Beans.	Peas.	Total.											
	Acres.	Acres.	Acres.	Acres	Acres.	Acres.	Acres.	Acres	Acres.	Acres	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acrs.	Acres.	Acres	Acres.	Acres.	Acres.
1. Aberdeen . .	627,742	593,912	33,830	33	29,772	190,938	86	178	..	53	221,060	7,723	83,959	..	130	94	49	2,192	253	278,014	246	209
2. Argyll . .	128,248	59,145	69,103	..	1,751	18,114	11	439	45	1	20,361	3,591	5,645	18	40	272	2	55	20	28,663	23	465
3. Ayr . . .	314,067	150,828	163,239	1,10	549	47,490	39	172	473	5	49,832	10,504	7,828	359	189	664	..	2,058	194	78,932	111	157
4. Banff . . .	158,992	148,795	10,197	..	9,505	48,636	8	38	57	16	58,260	1,925	20,475	..	7	7	60	665	14	67,312	13	57
5. Berwick . .	190,259	141,578	48,681	3,031	20,543	32,073	9	85	679	23	56,443	2,740	23,330	212	93	1,288	32	456	13	56,800	15	154
6. Bute . . .	25,588	15,628	9,960	27	51	5,194	3	37	42	2	5,356	1,293	1,286	9	12	174	..	2	18	7,382	13	83
7. Caithness . .	107,210	82,541	24,669	..	1,196	31,894	3	..	..	..	33,093	1,413	11,903	..	15	45	2	265	2	35,687	12	104
8. Clackmannan .	15,597	8,963	6,634	445	266	3,507	..	7	246	1	4,472	553	770	1	4	60	..	103	19	2,849	6	126
9. Dumbarton .	47,422	25,849	21,573	838	31	8,621	3	1	6	4	9,504	2,989	1,415	13	43	203	3	113	53	11,432	21	60
10. Dumfries . .	247,573	135,444	112,129	116	742	44,663	38	35	40	12	45,646	4,962	16,211	229	115	1,694	4	76	64	66,323	60	60
11. Fife . . .	245,180	176,659	68,521	10,894	18,031	47,629	514	1,173	292	16	78,549	18,361	22,268	28	111	813	19	507	199	54,255	1,037	512
12. Forfar . .	247,532	223,643	23,889	8,995	22,904	57,241	459	1,511	49	13	91,172	18,725	31,809	14	145	142	4	347	361	80,674	146	104
13. Haddington .	109,977	88,872	21,105	4,050	17,702	18,073	28	9	142	108	40,112	7,959	13,502	287	504	439	35	150	217	24,938	504	225
14. Inverness . .	148,237	84,567	63,670	11	6,096	29,652	131	817	2	1	36,810	5,513	9,626	3	37	82	4	77	17	31,778	18	602
15. Kincardine .	119,015	110,622	8,393	1,070	13,091	30,521	38	129	49	4	44,902	4,588	16,213	..	6	12	2	355	46	44,450	30	18
16. Kinross . .	33,583	22,575	11,008	172	411	8,159	18	128	..	..	8,888	1,527	2,542	..	17	130	..	68	9	9,366	15	13
17. Kirkcudbright .	180,312	95,326	84,986	21	188	28,900	..	59	30	..	29,198	1,956	11,160	76	47	2,104	..	66	15	50,568	33	108
18. Lanark . .	248,834	140,215	108,619	2,696	296	46,098	81	23	117	5	49,316	7,135	9,810	15	396	1,390	4	675	1,854	68,894	435	291
19. Linlithgow .	57,502	36,540	20,962	2,219	3,001	12,114	84	13	50	1	17,482	2,811	3,264	8	57	436	21	154	50	12,092	18	147
20. Midlothian .	121,204	80,504	40,700	4,539	7,629	22,468	175	1	16	63	34,891	7,456	9,742	47	378	642	9	134	186	26,569	355	95
21. Moray . .	98,605	91,587	7,018	580	10,784	24,629	58	387	20	5	36,463	1,855	14,120	8	6	9	27	231	25	38,744	15	84
22. Nairn . . .	25,521	23,485	2,036	25	2,465	6,354	15	30	..	2	8,891	288	3,895	3	2	10	..	21	4	10,303	4	64
23. Orkney . .	108,071	93,907	14,164	..	4,154	34,603	2	4	..	..	38,763	2,436	13,862	..	17	11	8	151	..	88,526	7	126
24. Peebles . .	50,458	26,666	23,792	..	625	7,520	9	3	..	3	8,160	580	3,408	..	18	676	1	38	13	13,753	13	6
25. Perth . . .	329,299	238,055	91,244	7,782	6,480	77,996	290	914	1,097	12	94,571	21,445	26,050	39	102	1,277	9	565	2,342	90,065	658	982
26. Renfrew . .	84,469	37,309	47,160	2,073	80	12,331	6	4	131	2	14,627	3,549	2,231	14	110	119	8	105	77	16,348	52	69
27. Ross & Cromarty	136,963	111,779	25,184	779	9,681	32,769	63	515	2	9	43,818	7,364	14,916	8	79	98	39	223	23	44,860	19	332
28. Roxburgh . .	176,561	115,507	61,054	577	12,354	28,683	5..	7	180	5	41 806	1,434	19,602	66	92	895	9	147	22	51,346	30	58
29. Selkirk . .	29,839	15,588	14,251	18	479	4,637	..	..	.	2	5,106	217	2,458	3	17	197	..	51	4	7,527	2	5
30. Shetland . .	26,740	14,153	12,587	..	857	6,854	2	1	..	..	7,714	2,330	1,063	.	626	..	..	3	..	2,040	1	376
31. Stirling . .	113,777	58,653	55,124	2,029	1,664	21,240	85	17	1,774	3	26,812	4,193	3,968	15	58	387	3	948	162	21,361	31	715
32. Sutherland .	30,336	22,858	7,478	..	623	7,850	10	27	..	..	8,510	1,372	2,767	..	7	..	3	21	3	10,016	1	158
33. Wigtown . .	154,333	108,484	45,849	135	368	34,777	..	46	187	..	35,513	1,690	14,157	293	18	509	1	122	8	55,963	40	170
Total . .	4,739,046	3,380,237	1,358,809	54,359	204,369	1,032,198	2,268	6,810	5,726	371	1,306,101	162.477	425,255	1,768	3,498	14,879	358	11,146	6,270	1,487,830	3,984	6,671

TABLE No. 2.—TOTAL PRODUCE OF WHEAT, BARLEY, AND OATS, ACREAGE and YIELD per Acre in the Year 1919, compared with the YIELD for the Years 1918 and 1917, and the AVERAGE of the Ten Years, 1909-1918, in each COUNTY of SCOTLAND.

COUNTIES.	WHEAT.						BARLEY, INCLUDING BERE.						OATS.					
	Total Produce in 1919.	Acreage in 1919.	Yield per acre.			Average of the Ten Years, 1909-1918.	Total Produce in 1919.	Acreage in 1919.	Yield per acre.			Average of the Ten Years, 1909-1918.	Total Produce in 1919.	Acreage in 1919.	Yield per acre.			Average of the Ten Years, 1909-1918.
			1919.	1918.	1917.				1919.	1918.	1917.				1919.	1918.	1917.	
	Qrs.	Acres.	Bush.	Bush.	Bush.	Bush.	Qrs	Acres.	Bush.	Bush.	Bush.	Bush.	Qrs.	Acres.	Bush.	Bush.	Bush.	Bush.
Aberdeen	80	16	41.1	31.2	26.23	*30.6	92,000	23,250	31.5	32.3	32.40	33.7	874,000	207,644	33.7	37.6	36.99	36.9
Argyll	5	2	21.0	36.7	40.00	*28.9	7,000	1,693	33.2	37.7	37.82	38.5	87,000	20,194	34.3	33.8	34.66	34.7
Ayr	13,000	2,156	47.7	46.8	46.29	45.8	2,900	496	46.1	40.7	42.58	41.3	320,000	51,192	49.9	47.8	45.38	49.0
Banff	50	13	29.7	40.0	..	—	38,000	7,480	40.5	36.5	37.47	33.6	246,000	52,289	37.7	42.1	43.78	38.4
Berwick	33,000	6,817	38.4	39.5	35.48	37.9	70,000	17,535	31.9	30.6	30.72	33.8	150,000	35,149	34.1	36.0	37.62	37.3
Bute	230	45	40.0	43.7	40.57	*44.9	180	24	42.0	42.2	39.50	38.8	29,000	5,293	43.4	42.7	39.38	38.9
Caithness	..	..	..	..	..	..	4,600	1,198	31.0	30.2	32.60	30.3	129,000	33,278	31.1	31.1	34.67	31.8
Clackmannan	2,100	436	38.2	39.6	41.57	43.6	1,200	259	36.0	37.9	39.61	36.1	17,000	3,685	38.0	40.7	43.09	39.5
Dumbarton	4,400	975	36.2	38.7	40.11	37.8	130	27	36.9	44.9	32.76	34.3	50,000	8,797	45.8	43.4	42.08	42.9
Dumfries	700	145	36.8	39.7	37.50	39.2	3,000	631	38.2	38.7	36.94	38.0	228,000	50,516	36.2	41.7	40.04	37.0
Fife	74,000	15,694	38.0	40.4	38.66	36.6	78,000	14,911	42.1	40.7	41.42	37.3	262,000	48,639	43.2	51.1	47.91	41.4
Forfar	48,000	11,494	33.2	37.7	35.19	37.6	78,000	20,586	30.3	36.2	35.45	36.2	323,000	61,334	42.2	53.4	53.60	50.6
Haddington	40,000	7,773	41.0	42.7	41.25	42.6	80,000	14,749	43.6	43.9	43.22	43.4	107,000	18,929	45.1	49.1	49.76	46.3
Inverness	1,100	226	39.5	40.4	41.35	39.1	16,000	5,139	24.7	25.6	25.61	27.3	110,000	31,110	28.2	32.5	32.45	30.2
Kincardine	7,200	1,576	36.4	38.8	37.46	37.0	49,000	11,921	32.9	34.8	34.10	33.0	157,000	34,162	36.8	39.8	40.35	39.0
Kinross	1,700	337	40.3	39.0	41.59	43.3	1,700	371	36.9	38.3	40.08	36.6	41,000	8,283	39.2	39.6	40.82	35.4
Kirkcudbright	300	54	37.1	38.6	34.13	37.6	1,100	219	40.5	41.1	39.26	37.8	143,000	33,029	34.7	42.0	38.37	37.4
Lanark	15,000	3,441	35.9	38.0	35.88	35.9	1,600	345	36.4	38.3	35.71	34.1	294,000	48,592	48.4	43.9	44.03	37.9
Linlithgow	17,000	3,203	41.8	43.1	42.06	43.0	14,000	2,355	46.4	42.7	43.64	43.1	77,000	12,738	48.2	49.9	49.39	45.5
Mid-Lothian	38,000	7,478	40.7	43.6	45.23	45.4	29,000	5,696	40.7	41.1	41.77	42.0	124,000	23,510	42.1	45.7	47.64	43.4
Moray	4,700	1,001	37.6	40.2	42.17	41.1	43,000	9,385	36.6	36.6	35.89	34.8	133,000	27,248	39.2	43.8	45.99	44.1
Nairn	200	44	36.0	35.0	..	†34.6	8,300	2,142	30.6	33.6	34.68	30.3	29,000	7,049	32.4	34.2	35.45	32.8
Orkney	..	..	..	..	..	..	16,000	4,229	30.8	30.0	33.40	31.7	127,000	35,928	28.3	29.8	30.22	29.9
Peebles	11	3	30.3	36.0	32.00	—	1,700	412	32.0	31.5	31.36	31.8	32,000	8,389	30.3	33.3	35.20	33.4
Perth	42,000	8,880	37.7	40.4	38.87	38.7	23,000	5,253	34.4	37.0	35.91	35.8	449,000	83,394	43.1	46.2	49.69	43.0
Renfrew	12,000	2,377	39.5	42.1	46.64	42.5	270	60	36.3	37.9	34.62	38.2	67,000	12,556	42.5	42.4	44.16	44.9
Ross and Cromarty	7,400	1,371	43.4	43.9	43.79	41.4	34,000	8,478	32.5	30.6	30.31	30.7	173,000	35,597	38.9	40.5	41.31	37.8
Roxburgh	7,100	1,502	37.9	40.3	32.83	35.6	53,000	11,098	38.0	38.0	35.54	35.6	135,000	31,852	33.9	41.8	40.78	38.7
Selkirk	100	28	32.0	40.0	40.00	‡34.7	1,800	366	40.0	38.8	36.43	33.8	17,000	4,864	28.5	40.3	40.05	36.4
Shetland	..	..	..	..	..	..	2,500	900	22.0	21.8	25.85	24.3	16,000	7,039	17.9	21.3	26.38	25.8
Stirling	13,000	2,284	45.4	40.0	45.26	44.4	8,500	1,480	45.7	38.9	40.61	40.4	124,000	22,579	44.0	39.1	39.81	39.5
Sutherland	..	1	3.0	32.0	..	—	2,200	642	27.9	34.5	33.07	32.9	25,000	8,169	24.6	33.2	34.94	33.7
Wigtown	700	137	41.6	39.4	38.88	39.2	2,100	416	39.4	39.3	36.91	39.6	210,000	37,784	44.4	46.5	45.93	40.9
Total	383,000	79,509	38.5	40.6	39.94	39.8	764,000	173,746	35.2	35.4	35.43	35.3	5,305,000	1,110,811	38.2	41.5	41.85	39.2

* Average of 9 years only.

† Average of 7 years only.

‡ Average of 8 years only.

TABLE No. 8.—TOTAL PRODUCE OF BEANS, PEAS, AND POTATOES, ACREAGE and YIELD per Acre in the Year 1919, compared with the YIELD for the Years 1918 and 1917, and the AVERAGE of the Ten Years, 1909-1918, in each COUNTY of SCOTLAND.

COUNTIES.	BEANS. Total Produce in 1919.	BEANS. Acreage in 1919.*	BEANS. Yield per acre. 1919.	BEANS. Yield per acre. 1918.	BEANS. Yield per acre. 1917.	BEANS. Average of the Ten Years, 1909-1918.	PEAS. Total Produce in 1919.	PEAS. Acreage in 1919.¶	PEAS. Yield per acre. 1919.	PEAS. Yield per acre. 1918.	PEAS. Yield per acre. 1917.	PEAS. Average of the Ten Years, 1909-1918.	POTATOES. Total Produce in 1919.	POTATOES. Acreage in 1919.	POTATOES. Yield per acre. 1919.	POTATOES. Yield per acre. 1918.	POTATOES. Yield per acre. 1917.	POTATOES. Average of the Ten Years, 1909-1918.
	Qrs.	Acres.	Bush.	Bush.	Bush.	Bush.	Qrs.	Acres.	Bush.	Bush.	Bush	Bush.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.
Aberdeen	10	20	4.0	20.0	9.33	23.5	20	25	6.6	16.0	10.86	18.5	45,000	7,302	6.2	8.2	8.30	6.4
Argyll	370	101	29.6	28.2	26.85	25.2	..	..	..	..	..	—	23,000	3,828	6.1	5.7	6.50	5.7
Ayr	2,900	581	39.8	38.7	36.79	36.2	..	..	..	..	..	‖36.9	80,000	10,293	7.8	8.7	9.60	9.1
Banff	170	52	26.7	30.0	30.41	28.9	50	16	22.4	30.6	19.58	23.9	9,700	1,829	5.3	5.6	6.80	6.2
Berwick	2,800	830	26.9	28.8	31.17	32.7	80	38	20.7	14.3	25.75	†22.7	10,000	2,576	3.9	5.5	7.28	6.5
Bute	190	53	29.3	29.9	25.95	25.4	3	1	24.0	..	..	‡24.1	7,300	1,252	5.9	7.2	7.87	6.9
Caithness	..	..	..	..	.	.	..	..	..	..	..	..	6,300	1,407	4.5	4.0	5.64	4.5
Clackmannan	1,500	294	42.0	50.0	50.00	44.8	..	..	..	..	..	—	2,700	457	5.9	6.1	7.11	7.0
Dumbarton	260	56	37.0	30.3	33.93	50.1	..	..	..	..	..	—	19,000	2,812	6.7	7.8	8.12	7.8
Dumfries	150	51	22.8	23.1	26.00	†29.9	..	..	..	..	..	—	28,000	4,362	6.4	7.6	7.49	7.0
Fife	1,700	337	39.8	38.2	36.76	37.6	..	..	..	24.6	18.00	†28.5	82,000	17,435	4.7	7.3	7.12	5.7
Forfar	180	43	34.0	38.0	39.74	36.5	..	..	..	30.0	..	‡31.8	89,000	18,297	4.9	7.0	7.79	6.6
Haddington	570	138	32.8	30.5	31.84	33.4	30	7	31.4	30.0	31.71	32.4	39,000	7,758	5.0	7.0	7.67	7.0
Inverness	20	6	27.3	32.0	..	‡27.4	..	..	.	..	..	‡25.5	18,000	5,328	3.8	3.9	4.88	3.7
Kincardine	150	35	33.7	35.8	36.00	33.7	8	2	32.0	32.0	..	§28.5	18,000	4,130	4.4	6.0	6.52	5.5
Kinross	40	9	32.0	50.0	..	§40.2	.	..	.	36.0	..	—	8,100	1,251	6.6	6.6	7.18	7.1
Kirkcudbright	140	32	34.1	35.1	32.27	36.4	..	..	..	..	..	—	11,000	1,736	6.2	6.9	6.98	6.2
Lanark	580	149	31.1	31.8	32.33	31.0	..	..	..	..	..	‡22.9	57,000	6,612	8.6	9.2	10.11	7.9
Linlithgow	290	65	35.8	35.0	36.65	34.0	..	..	..	..	..	—	15,000	2,604	5.8	7.0	8.09	7.4
Mid-Lothian	80	19	34.5	36.7	34.11	†33.6	..	..	..	34.0	33.00	31.7	37,000	7,040	5.2	6.8	8.01	7.2
Moray	40	15	23.7	16.4	23.90	28.3	8	3	22.5	20.0	18.45	22.7	9,300	1,829	5.1	5.3	6.73	6.0
Nairn	..	..	..	..	..	—	..	..	..	..	..	‡26.6	1,100	270	4.0	5.0	6.69	4.7
Orkney	..	..	..	..	..	..	..	..	..	..	..	..	9,700	2,444	4.0	3.5	6.91	5.0
Peebles	..	..	..	..	..	—	..	..	..	..	..	‖29.9	2,600	490	5.4	7.3	8.12	6.8
Perth	6,600	1,201	43.7	35.4	42.23	32.5	15	10	12.0	..	24.00	‡18.1	93,000	19,813	4.7	7.0	7.67	6.6
Renfrew	780	149	42.1	38.5	38.65	40.2	..	..	.	26.0	..	—	24,000	3,460	7.0	7.6	8.22	7.6
Ross and Cromarty	70	14	42.0	32.0	30.00	33.8	10	3	26.0	24.0	..	†24.2	26,000	7,245	3.6	3.9	5.68	4.5
Roxburgh	530	147	28.9	31.6	29.08	31.4	10	3	26.0	31.7	32.00	28.9	6,100	1,321	4.6	6.6	8.05	6.0
Selkirk	30	9	30.0	..	..	‖22.3	..	..	..	..	..	—	1,000	188	5.3	7.1	7.79	5.9
Shetland	..	..	..	..	..	..	..	..	..	..	..	..	14,000	2,460	5.7	3.1	5.87	4.3
Stirling	11,700	2,014	46.3	40.2	43.01	42.4	..	..	..	..	..	§32.9	24,000	3,871	6.2	7.3	7.07	7.2
Sutherland	..	..	..	..	..	—	..	..	..	..	24.00	§22.7	6,900	1,402	4.9	5.0	5.58	4.9
Wigtown	970	234	33.2	34.0	34.05	37.8	..	..	..	..	.	..	9,700	1,511	6.4	6.3	7.97	7.4
Total	32,800	6,654	39.4	36.5	38.70	36.8	230	103	13.0	25.5	20.21	25.7	832,000	154,596	5.4	6.8	7.51	6.4

* Exclusive of a certain acreage, not ascertainable, the produce of which was cut green. † Average of 9 years only. ‡ Average of 7 years only.
§ Average of 8 years only. ‖ Average of 6 years only. ¶ Exclusive of 267 acres, the produce of which was cut or picked green.

ABLE No. 4.—TOTAL PRODUCE of TURNIPS (including SWEDES) and MANGELS, ACREAGE and YIELD per Acre in the Year 1919, compared with the YIELD for the Years 1918 and 1917, and the AVERAGE of the Ten Years, 1909-1918, in each COUNTY of SCOTLAND.

COUNTIES.	TURNIPS AND SWEDES.						MANGELS.					
	Total Produce in 1919.	Acreage in 1919.	Yield per Acre.			Average of the Ten Years, 1909-1918.	Total Produce in 1919.	Acreage in 1919.	Yield per Acre.			Average of the Ten Years, 1909-1918.
			1919.	1918.	1917.				1919.	1918.	1917.	
	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.	Tons.	Acres.	Tons.	Tons.	Tons.	Tons.
Aberdeen	1,593,000	82,695	19.3	12.2	17.23	15.2	100	4	25.0	..	30.00	*16.1
Argyll	106,000	6,046	17.6	16.4	16.90	16.3	350	25	14.2	16.2	15.46	13.9
Ayr	172,000	8,594	20.0	21.0	23.62	20.9	11,000	549	20.1	21.4	23.83	22.8
Banff	368,000	20,527	17.9	12.5	23.60	15.8	..	..	..	14.0	30.00	15.3
Berwick	417,000	22,712	18.4	16.0	19.02	18.1	4,100	273	15.1	16.1	16.02	16.9
Bute	23,000	1,426	16.3	16.3	16.55	16.8	140	9	15.8	16.2	15.38	15.9
Caithness	242,000	12,087	20.0	11.6	20.14	17.2	..	..	..	..	..	..
Clackmannan	15,000	798	18.8	15.2	18.29	14.5	12	1	12.0	12.0	14.00	10.8
Dumbarton	32,000	1,623	20.0	19.5	22.53	20.9	310	12	25.5	26.5	26.36	20.5
Dumfries	290,000	15,630	18.6	19.0	18.66	16.1	4,800	278	17.2	19.4	18.97	18.4
Fife	421,000	21,926	19.2	14.8	21.74	16.2	930	56	16.6	12.0	11.32	11.5
Forfar	445,000	31,888	14.0	15.7	23.20	19.4	130	9	14.2	16.9	20.00	21.3
Haddington	199,000	13,163	15.1	11.7	21.49	17.7	6,800	426	15.9	15.3	21.68	19.6
Inverness	146,000	9,890	14.8	10.4	17.39	13.8	50	3	17.0	8.0	15.00	10.8
Kincardine	222,000	15,747	14.1	13.9	16.65	14.0	..	..	..	16.0	..	†13.8
Kinross	61,000	2,588	23.4	15.7	19.94	15.8	..	..	..	10.0	12.00	†8.8
Kirkcudbright	168,000	11,482	14.6	18.9	18.90	16.5	2,000	109	18.1	20.5	19.67	19.6
Lanark	188,000	10,417	18.0	19.3	23.14	19.4	410	34	12.0	10.1	9.96	7.6
Linlithgow	55,000	3,330	16.4	16.2	21.40	18.4	420	18	23.6	22.1	26.00	23.5
Mid-Lothian	151,000	10,004	15.0	13.0	21.36	17.9	1,100	57	19.2	23.7	21.33	20.4
Moray	229,000	14,191	16.1	10.9	21.98	17.0	190	11	17.3	12.9	27.89	19.8
Nairn	55,000	3,908	14.0	10.0	16.97	13.9	..	..	..	8.0	15.00	‡12.8
Orkney	120,000	13,866	8.6	6.0	10.64	10.2	..	..	..	..	..	—
Peebles	61,000	3,557	17.1	16.8	21.45	18.6	..	..	..	..	..	—
Perth	393,000	26,971	14.6	14.0	20.28	17.3	1,100	61	18.0	16.0	23.61	17.2
Renfrew	46,000	2,418	19.0	18.3	18.82	18.3	560	29	19.2	18.9	22.33	16.9
Ross and Cromarty	258,000	14,833	17.4	12.5	18.04	15.4	410	21	19.5	11.7	17.85	16.0
Roxburgh	237,000	19,230	12.3	11.8	16.64	14.9	1,500	103	14.2	17.7	17.85	18.1
Selkirk	38,000	2,479	15.5	13.4	19.39	14.7	..	..	..	..	16.00	†15.5
Shetland	12,000	1,096	10.8	9.5	12.35	11.4	..	..	..	..	..	..
Stirling	110,000	4,358	25.3	24.9	24.51	25.3	890	16	24.5	25.9	22.56	24.0
Sutherland	52,000	2,877	18.2	9.0	15.54	14.6	8	1	3.0	..	..	—
Wigtown	221,000	14,094	15.7	17.2	22.79	17.0	5,900	402	14.6	21.8	28.84	22.8
Total	7,146,000	426,451	16.8	13.9	19.44	16.4	43,000	2,507	17.0	19.2	21.82	19.7

* Average of 7 years only. † Average of 6 years only. ‡ Average of 8 years only.

TABLE No. 5.—TOTAL PRODUCE OF HAY from Ryegrass and other Rotation Grasses and Clover, also Total from Permanent Grass, ACREAGE, and YIELD per Acre in the Year 1919, compared with the YIELD for the Years 1918 and 1917, and the AVERAGE of the Ten Years, 1909-1918, in each COUNTY of SCOTLAND.

COUNTIES.	FROM CLOVER, SAINFOIN, AND GRASSES.						FROM PERMANENT GRASS.					
	Total Produce in 1919.	Acreage in 1919.	Yield per Acre.			Average of the Ten Years, 1909-1918.	Total Produce in 1919.	Acreage in 1919.	Yield per Acre.			Average of the Ten Years, 1909-1918.
			1919	1918.	1917.				1919.	1918.	1917.	
	Tons.	Acres.	Cwts.	Cwts.	Cwts.	Cwts.	Tons.	Acres.	Cwts.	Cwts.	Cwts.	Cwts.
Aberdeen	55,000	47,544	23.2	28.1	30.26	28.9	620	741	17.1	21.9	22.64	22.4
Argyll	14,000	12,078	22.4	27.5	31.19	29.0	13,950	13,691	20.7	28.6	27.11	31.8
Ayr	39.000	27,116	23.4	29.7	32.14	31.5	40,000	21,584	36.6	38.9	43.13	42.4
Banff	11,000	9,304	23.9	27.7	26.06	29.4	370	367	20.2	20.2	20.87	16.9
Berwick	11,000	10,427	20.5	29.3	30.01	32.6	1,500	1,787	16.6	23.1	23.19	24.6
Bute	4,600	2,435	37.4	37.6	37.83	36.0	1,070	617	34.6	35.7	35.16	33.6
Caithness	7,900	9,905	16.0	16.8	17.29	19.1	250	703	7.1	8.4	7.98	10.3
Clackmannan	2,300	1,303	35.4	39.8	41.35	41.2	2,310	1,164	39.8	43.4	47.82	41.4
Dumbarton	7,900	5,811	27.0	28.9	33.22	34.3	3,200	2,172	29.2	34.6	34.72	35.3
Dumfries	19,000	18,436	20.7	26.0	27.28	24.7	18,300	18,136	20.5	25.0	26.43	26.1
Fife	43,000	25,965	33.3	39.0	37.15	36.3	3,480	2,757	25.5	34.9	35.32	31.5
Forfar	31,000	21,519	29.1	36.7	35.13	35.4	1,490	1,127	26.4	28.4	28.40	26.0
Haddington	21,000	10,510	39.3	43.1	40.52	47.4	720	529	27.1	35.3	32.57	32.3
Inverness	11,000	11,959	18.4	19.1	23.78	21.9	6,810	7,427	18.4	20.0	15.17	18.8
Kincardine	16,000	12,311	26.6	29.3	27.92	27.0	210	214	20.2	24.9	19.50	17.6
Kinross	4,300	2,844	30.3	31.1	36.48	33.4	770	499	30.8	32.1	34.37	32.7
Kirkcudbright	7,100	8,236	17.2	23.3	28.67	25.5	11,200	11,644	19.3	25.0	27.57	26.0
Lanark	48,000	31,659	30.3	32.3	32 93	32.3	20,700	13,970	29.3	31.3	29.03	30.7
Linlithgow	13,000	7,018	37.6	41.0	38.84	45.2	2,260	1,225	36.5	37.0	34.81	36.1
Mid-Lothian	23,000	11,540	39.2	40.2	40.29	48.4	3,500	2,180	32.6	35.5	32.70	33.9
Moray	5,300	5,452	19.6	27.4	28.94	31.6	200	207	18.7	26.5	24.48	26.0
Nairn	1,300	1,540	17.3	17.1	23.77	19.9	20	26	14.0	15.0	18.09	15.7
Orkney	7,800	9,475	16.5	17.9	17.25	19.1	60	255	4.8	5.7	7.47	9.3
Peebles	2,900	2,429	23.5	26.7	27.56	31.1	1,450	1,389	20.8	27.6	28.29	30.4
Perth	47,000	32,623	28.5	31.4	30.79	30.1	14,100	10,955	25.8	29.0	27.83	25.5
Renfrew	17,000	9.935	33.2	39.7	42.30	39.0	11,600	6,445	35.9	41.9	44.38	39.1
Ross and Cromarty	12,000	13,127	18.6	22.4	23.08	22.7	2,070	2,518	16.0	18.0	16.71	16.3
Roxburgh	10,000	9,051	22.9	30.2	31.55	30.9	7,330	6,543	22.4	25.0	28.85	27.2
Selkirk	1,400	1,314	21.3	29.4	33.62	31.5	1,860	1,832	20.2	24.3	21.57	25.6
Shetland	1,000	1,388	14.3	24.7	24.76	23.5	1,000	1,619	12.5	25.8	12.94	20.2
Stirling	19,000	11,717	33.0	37.3	36.54	35.6	12,000	6,970	34.5	39.7	39.45	35.4
Sutherland	3,600	4,411	16.3	17.8	18.74	18.3	720	1,621	8.9	10.7	17.10	15.9
Wigtown	3,800	8,864	19.8	25.1	28.29	31.6	5,450	4,765	22.9	33.1	32.89	29.7
Total	521,000	394,246	26.4	30.5	31.19	31.3	191,000	147,679	25.8	30.1	30.51	30.0

TABLE No. 6.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS IN EACH COUNTY OF SCOTLAND AS RETURNED ON JUNE 4, 1920

COUNTIES.	HORSES (including Ponies).					CATTLE.							SHEEP.				PIGS.		
	Used solely for Agriculture, &c.*	Stallions.†	Unbroken Horses.		Other Horses	Cows in Milk.	Cows in Calf, but not in Milk.	Heifers in Calf.	Bulls used for Service.	Other Cattle			Ewes kept for Breeding.	Rams to be used for Service.	1 Year Old and above.	Under 1 Year.	Sows kept for Breeding.	Boars used for Service.	Other Pigs.
			1 Year & above.	Under 1 Year.						2 Years & above.	1 Year & under 2 Years.	Under 1 Year							
1. Aberdeen	20,986	68	7,101	2,877	2.790	37,370	2,509	2,052	1,662	41,678	48,664	36,181	65,576	1,881	35,642	67,338	1,316	161	8,885
2. Argyll	4,162	28	1,405	585	655	17,834	2,293	1,834	982	11,045	12,014	12,160	359,146	11,097	138,255	268,320	460	57	3,930
3. Ayr	7,235	67	2,005	853	1,589	44,944	5,873	8,617	2,421	12,054	17,997	19,206	151,458	3,776	40,257	138,751	934	78	10,615
4. Banff	5,968	17	1,897	787	743	10,575	795	685	457	6,856	13,442	10,927	23,261	657	9,411	22,418	373	44	2,134
5. Berwick	3,871	10	699	164	616	2,477	270	594	296	6,186	5,810	2,056	111,127	2,757	36,667	146,558	552	85	3,082
6. Bute	923	10	256	138	144	2,878	306	403	191	1,518	2,196	2,193	16,813	619	7,151	13,915	58	9	560
7. Caithness	4,005	15	1,157	537	435	5,974	429	374	184	2,130	5,471	5,428	54,119	1,403	18,713	48,876	207	24	1,535
8. Clackmannan	512	7	149	81	80	898	130	127	50	882	848	434	5,762	241	2,018	5,376	101	13	421
9. Dumbarton	1,343	15	385	112	259	5,359	953	818	285	2,470	1,846	1,585	29,671	905	9,102	24,834	181	26	908
10. Dumfries	5,045	32	1,660	672	1,311	18,263	1,640	4,868	1,275	11,187	15,600	13,306	229,355	5,343	62,857	217,869	984	64	7,842
11. Fife	6,848	32	1,952	669	1,324	9,413	1,159	1,306	587	12,615	10,015	5,889	30,250	1,057	11,653	39,254	958	115	5,017
12. Forfar	7,448	19	1,006	330	1,169	9,573	815	636	448	15,311	10,949	6,506	58,407	2,292	25,517	61,825	870	84	5,284
13. Haddington	2,929	5	384	152	319	1,756	200	315	157	3,157	2,013	1,183	39,824	1,207	21,590	48,320	284	31	1,655
14. Inverness	6,066	45	1,358	665	585	16,475	2,341	1,161	551	5,907	9,091	11,582	231,159	7,254	90,268	168,269	226	28	1,324
15. Kincardine	3,675	4	935	350	514	5,489	372	306	262	5,628	7,256	5,000	14,816	453	4,927	15,043	258	18	1,475
16. Kinross	813	5	269	110	134	1,109	96	193	89	1,662	2,248	1,006	10,965	341	3,197	11,791	103	13	571
17. Kirkcudbright	3,508	54	1,097	466	787	16,636	807	4,527	986	10,822	12,235	8,917	144,899	3,766	50,654	138,326	745	69	10,094
18. Lanark	6,256	60	1,544	593	1,291	27,845	5,116	4,396	1,566	11,345	10,921	9,495	93,940	2,652	33,363	90,605	890	88	6,446
19. Linlithgow	1,545	8	535	184	326	3,853	615	695	260	2,430	1,935	1,502	3,445	72	4,365	4,204	181	29	1,262
20. Mid-Lothian	3,125	17	523	208	760	7,848	604	565	236	3,300	2,501	1,320	63,199	1,362	28,821	66,654	1,291	141	8,068
21. Moray	3,438	12	1,023	488	421	5,450	386	337	230	3,736	6,929	4,835	17,533	519	6,681	15,482	195	16	1,350
22. Nairn	894	..	317	97	153	1,841	138	135	104	595	1,543	1,754	5,688	254	2,931	4,520	109	12	445
23. Orkney	4,832	19	1,008	653	757	8,304	804	694	234	4,662	8,901	7,999	11,913	291	3,981	13,601	148	18	1,145
24. Peebles	812	5	223	62	172	1,595	197	381	158	1,480	1,787	1,188	88,847	2,119	18,838	82,381	25	5	383
25. Perth	9,542	43	2,433	884	1,393	13,670	1,323	1,809	930	14,882	19,599	13,912	245,389	7,592	94,504	204,824	971	127	6,038
26. Renfrew	2,235	19	636	231	462	11,110	2,686	1,774	569	3,115	3,666	2,991	13,878	414	6,073	13,167	262	32	1,724
27. Ross & Cromarty	5,421	21	1,132	449	495	13,914	1,441	1,205	381	6,368	8,062	7,953	110,330	3,157	57,541	87,865	371	47	2,151
28. Roxburgh	3,243	15	575	180	742	3,871	366	677	291	6,129	5,009	2,769	190,470	4,776	68,081	220,950	395	35	2,447
29. Selkirk	499	..	77	23	100	949	61	136	61	386	844	588	80,687	1,579	18,154	72,825	73	7	347
30. Shetland	2,359	58	283	145	1,742	5,005	776	345	88	1,901	2,843	2,540	66,122	2,218	25,552	46,258	39	4	355
31. Stirling	3,195	41	1,120	400	570	8,138	1,621	1,452	566	7,624	6,392	4,144	48,441	1,375	14,771	43,351	269	21	1,949
32. Sutherland	1,742	6	286	89	204	3,984	413	272	82	1,268	2,064	2,115	83,934	2,579	47,824	64,867	68	12	371
33. Wigtown	3,781	39	1,304	558	714	25,715	590	2,538	1,076	7,820	8,436	7,509	47,000	1,354	14,153	44,993	683	97	13,126
Total	138,251	799	36,734	14,792	23,761	350,115	38,137	46,227	17,724	228,149	269,187	216,173	2,756,421	77,362	1,013,512	2,513,630	14,580	1,605	112,374

* Including Mares kept for breeding

† Above two years old used, or intended to be used for service.

TABLE No. 7.—QUANTITY AND VALUE OF CORN, &c., imported into the United Kingdom in the undermentioned Years.

[*From Trade and Navigation Returns.*]

	Quantities.			Values.		
	1918.	1919.	1920	1918.	1919.	1920.
Wheat from—	Cwt.	Cwt	Cwt.	£	£	£
Russia . . .	..	..	2,400	.	..	8,262
United States .	24,757,610	31,769,800	45,422,800	22,674,274	30,901,414	69,588,10
Chile	..	.		..	..	..
Argentine Republic .	14,389,400	6,819,100	30,906,900	13,253,798	6,858,666	38,456,374
British East Indies .	621,400	100	20,000	591,219	37	35,0
Australia . . .	2,018,700	14,952,700	19,966,100	1,895,057	13,623,692	18,635,965
New Zealand . .	.	..	4,900	.	.	5,760
Canada . . .	15,968,700	17,864,900	10,189,000	14,499,776	17,509,824	15,581,564
Other countries . .	196,800	36,900	2,892,426	182,829	34,876	4,288,720
Total . .	57,947,010	71,443,000	109,404,026	58,097,953	68,422,509	146,844,754
Wheat, meal, and flour, from—						
France . . .			.	..	.	..
United States . .	17,963,100	10,274,070	5,837,400	21,029,822	14,923,818	10,872,260
Argentine Republic .	1,200	68,100	184,318	1,460	75,079	228,758
Australia . . .	1,679,100	1,577,000	1,481,200	2,366,294	2,289,891	2,325,722
Canada . . .	5,564,700	5,566 100	2,318,601	7,671,865	8,122,795	4,418,435
Other countries . .	1,151,500	225,800	2,148,621	1,618,756	317,661	3,406,284
Total . .	26,359,600	17,711,070	11,970,070	35,682,697	25,720,244	21,246,484
Barley	5,025,200	16,643,900	12,668,200	5,426,012	17,836,657	14,458,625
Oats	10,982,570	6,711,421	6,082,200	11,529,058	8,728,957	5,613,030
Peas	2,180,665	1,136,551	552,663	5,406,069	2,558,5[illegible]	1,057,587
Beans, other than Haricot	438,511	730,975		641,782	875,150	..
Indian corn . . .	14,490,177	16,560,900	33,840,160	13,678,534	13,722,093	27,371,447
Maize or maize products	1,447,664	2,318,768	1,751,220	1,631,090	2,252,466	1,974,107
Oat products . .	2,908,429	1,375,368	675,009	4,823,821	2,320,823	1,315,666
Offals of corn and grain, including rice-meal	93,923	3,768,760	..	74,020	3,125,062	..
Rice, exclusive of rice-meal—						
From Brit. East Indies	6,923,568	1,411,203	2,471,608	8,436,279	1,730,264	4,786,881
From other countries	667,520	612,920	478,555	1,103,217	1,251,981	1,397,008
Other kinds of grain and corn	4,563,706	2,003,394	..	7,578,766	3,075,307	.
Other kinds of meal and flour	1,013,089	53,768		1,329,976	102,065	..

TABLE No. 8.—RETURN OF THE AVERAGE PRICES OF WOOL in the Year 1919 and 1920.

Years.	Australian.	South African.	English Fleeces.
	Per lb. *s.* *d.*	Per lb. *s.* *d.*	Per lb. *s.* *d.* *s.* *d.*
1919	1 11¼	1 10⅜	2 8⅝ to 3 10⅞
1920	2 0⅝	2 6⅝	2 11 to 4 8¾

TABLE No. 9.—QUANTITIES AND VALUES OF CORN, MEAT, FOOD PRODUCTS, AND ARTICLES AFFECTING AGRICULTURE, imported into the United Kingdom in the Year 1920, with the Corresponding Figures for 1918 and 1919.

[*From Trade and Navigation Returns.*]

	Quantities.			Values.		
	1918.	1919.	1920.	1918.	1919.	1920.
ANIMALS, LIVING:—	No.	No.	No.	£	£	£
Cattle	..	..	..	..	..	..
Sheep and lambs	..	..	..	..	..	..
Swine	..	.	..	.	..	..
GRAIN, FLOUR, &c.:—	Cwt.	Cwt.	Cwt.	£	£	£
Wheat	57,947,610	71,443,000	109,404,026	53,097,953	68,422,509	146,844,754
Wheat, meal, and flour	26,859,600	17,692,170	..	35,682,697	25,729,244	21,246,484
Barley	5,025,200	16,043,900	12,668,200	5,426,012	17,836,657	14,458,625
Oats	10,982,570	6,711,421	6,082,200	11,529,053	6,723,957	5,618,030
Peas	2,180,665	1,136,551	582 663	5,406,069	2,583,569	1,057,587
Beans	438,511	730,975	.	641,782	875,150	..
Maize or Indian corn	14,490,177	16,860,900	33,840,160	18,678,584	18,722,038	27,371,447
Maize products	1,447,664	2,313,768	1,751,220	1,631,090	2,252,446	1,974,107
Oat products	2,908,429	1,875,868	675,009	4,823,821	2,320,823	1,815,666
Offals of corn and grain, including rice-meal	93,923	3,768,760	..	74,020	3,125,602	..
Rice, exclusive of rice-meal—						
From British East Indies	6,923,568	1,411,208	2,474,608	8,436,279	1,780,064	4,786,881
From other countries	667,520	619,920	478,555	1,003,217	1,251,981	1,397,008
Other kinds of grain & corn	4,564,706	2,003,394	..	7,578,706	3,075,307	..
Other kinds of meal and flour	1,018,089	53,708	.	1,329,976	102,065	.
MEAT:—	Cwt.	Cwt.	Cwt.	£	£	£
Beef, salted	14,652	68,761	45,261	97,811	452,215	280,358
*Beef	7,583,781	6,492,200	9,861,837	36,081,255	30,633,629	45,155,697
*Mutton	2,086,145	4,074,956	6,407,930	9,273,646	17,957,556	26,816,952
Bacon	10,473,562	8,281,198	5,611,630	90,381,595	78,591,919	50,367,469
Hams	1,554,943	1,813,154	322,966	18,028,626	15,989,697	2,958,196
Pork, salted (not bacon or hams)	11,691	24,074	23,492	77,511	175,588	185,214
*Pork	99,654	136,189	502,189	685,973	899,975	3,719,189
*Meat, unenumerated	690,620	1,121,581	..	3,322,004	5,543,197	..
" " salted	2,623	15,512	..	14,165	105,430	..
Tinned, canned extracts	2,188,650	2,768,728	953,363	19,218,108	22,518,946	7,685,658
All other kinds	..	1,631,593	270,374	..	10,880,905	1,807,606
*Rabbits (dead)	516,542	255,725	525,970	1,266,038	661,141	1,597,704
DAIRY PRODUCE:—	Cwt.	Cwt.	Cwt.	£	£	£
Butter	1,578,658	1,560,204	1,716,844	19,769,738	19,854,427	24,634,294
Margarine	301,650	459,369	897,972	1,563,401	2,229,838	5,514,425
Cheese	2,357,108	2,118,250	2,756,243	15,905,858	15,170,620	20,657,272
Total	4,237,411	4,137,823	5,370,559	37,239,001	37,254,985	50,805,991

* Fresh, Chilled and Frozen.

TABLE No. 9—*Continued.*

	Quantities.			Values.		
	1918.	1919.	1920.	1918.	1919.	1920.
				£	£	£
POULTRY (alive or dead)	84,893	147,567	94,464	287,169	1,527,992	871,872
GAME (alive or dead)	..	..	..	5,392	18,564	149,438
EGGS	Gt. Hunds. 2,656,415	Gt. Hunds. 5,644,895	Gt. Hunds. 7,070,266	4,621,649	8,613,326	11,579,096
Total value	..	..	..	4,914,210	10,159,882	12,600,406
FRUIT, VEGETABLES, &c.:—	Cwt.	Cwt.	Cwt.	£	£	£
Apples	410,169	2,967,227	4,510,497	903,982	6,245,874	9,824,700
Cherries	50	19,121	55,801	218	65,654	236,641
Plums	..	88,273	302,111	..	263,202	1,162,612
Pears	2,436	372,887	667,341	7,731	844,041	2,044,122
Grapes	415,399	565,434	593,408	1,880,794	1,767,335	2,080,551
Oranges	2,640,731	5,200,973	4,401,762	5,993,508	9,445,154	8,017,085
Lemons	792,143	655,205	500,495	1,950,242	1,006,455	708,757
Unenumerated	6,807	198,947	348,480	46,009	445,707	741,911
Onions	Bushels. 4,342,586	Bushels. 6,932,229	Bushels. 7,980,155	3,784,502	3,561,492	3,303,209
Potatoes	Cwt. 1,015,793	Cwt. 988,879	Cwt. 5,210,095	1,044,040	1,547,682	5,174,572
Vegetables, unenumerated (raw)	..	..	..	96,779	484,437	782,276
Hops	52	154,453	459,561	210	2,374,115	8,825,830
Total value	..	.		14,658,017	28,046,043	42,451,776
OTHER ARTICLES:—	Cwt.	Tons	Tons.	£	£	£
Lard	2,760,404	108,916	72,238	21,163,529	18,673,125	12,776,504
Wool, sheep and lambs	Lb. 413,453,747	Centals. 10,428,992	Centals. 8,741,397	36,839,476	96,888,830	88,440,502
Wood and timber—	Loads.	Loads.	Loads.			
Hewn (pit-props or pit-wood)	703,010	1,451,733	2,003,939	2,947,994	7,309,939	9,869,124
Sawn or split, planed or dressed	1,577,524	4,657,097	..	21,451,251	50,997,071	..
Staves	36,884	84,602	155,676	680,049	1,363,189	3,640,806
Oilseed-cake (not sweetened)	Tons. 10,828	Tons. 278,224	Tons. 227,215	210,034	5,820,530	3,649,535
Seeds—	Cwt.	Cwt.	Cwt.			
Clover and grass	232,799	287,742	283,816	1,375,897	1,960,278	2,015,262
Cotton	Tons. 337,490	Tons. 461,598	Tons. 442,942	6,469,762	9,773,600	8,455,765
Flax or linseed	Qrs. 1,309,631	Qrs. 2,764,559	Qrs. 889,377	8,158,170	20,662,835	15,689,256
Rape	292,442	397,363	29,961	1,662,008	2,707,832	1,097,080
Soya beans	Tons. ..	Tons. 61,565	Tons. 14,978	..	1,640,639	350,928
Bones (whether burnt or not)	5,144	13,025	16,094	121,982	177,150	238,062
Guano	..	101	12,740	..	1,250	159,568
Basic slag	..	1,697	17,584	..	10,640	184,916
Nitrate of soda (cubic nitre)	300	Cwt. 439,700	Cwt. 2,949,530	6,000	514,525	3,337,543
Phosphate of lime and rock phosphate	464,872	355,758	523,350	1,948,543	1,342,226	2,655,484
Cotton, raw of 100 lb.	Centals. 14,890,830	Centals. 19,582,367	Centals. 18,975,615	150,285,324	190,771,416	254,074,100
Hemp	Tons. 119,380	Tons. 120,986	Tons. 144,302	14,071,885	8,795,934	11,391,765
Flax	25,035	11,107	20,888	3,906,198	2,776,858	7,778,674
Hides untanned—	Cwt.	Cwt.	Cwt.			
Dry	560,819	947,985	753,485	4,289,511	8,030,593	7,148,084
Wet	1,063,622	721,447	483,296	7,622,410	5,633,867	4,098,891
Petroleum	Gallons. 1,324,405,125	Gallons. 713,888,737	Gallons. 876,027,440	63,938,294	36,079,174	66,461,537

TABLE No. 10.—QUANTITY AND VALUE OF DEAD MEAT imported into the United Kingdom in the undermentioned Years.

	Quantities.			Values.		
	1918.	1919.	1920.	1918.	1919.	1920.
BACON, from—	Cwt.	Cwt.	Cwt.	£	£	£
Denmark . . .	21,491	6,644	704,075	189,853	65,803	7,316,865
United States . .	8,645,318	5,893,514	3,362,264	74,536,767	52,114,884	29,453,894
Canada . . .	1,719,736	2,094,248	1,493,008	14,958,349	18,880,735	13,128,736
Other countries . .	87,017	286,792	52,283	696,626	2,530,497	468,474
Total . .	10,473,562	8,281,198	5,611,630	90,381,595	73,591,919	50,367,469
BEEF (salted), from—						
United States . .	13,285	53,763	40,207	88,054	360,668	259,810
Other countries . .	1,397	14,998	5,074	9,757	91,547	20,573
Total . .	14,682	68,761	45,281	97,811	452,215	280,383
***BEEF (fresh and refrigerated)—**						
Denmark . . .	..	..	1,150	..	..	7,071
United States . .	3,583,549	856,165	224,661	18,213,048	4,715,681	1,124,867
Uruguay . . .	210,087	809,063	803,330	955,746	1,431,967	3,667,332
Argentine Republic .	1,977,267	3,367,720	6,537,418	9,122,809	18,164,396	30,400,466
Australia . . .	547,660	622,318	836,989	1,969,461	2,488,184	3,496,878
New Zealand . .	388,382	424,735	370,988	1,341,316	1,771,322	3,703,650
Other countries . .	881,839	412,229	587,301	4,478,880	2,062,079	2,756,433
Total . .	7,538,784	6,492,230	9,361,837	36,081,255	30,633,629	45,155,697
HAMS, from—						
United States . .	1,419,008	1,718,363	283,591	11,903,181	15,264,376	2,598,627
Canada . . .	110,683	74,762	24,331	926,349	653,424	223,489
Other countries . .	25,252	20,029	14,984	199,096	71,897	136,080
Total . .	1,554,943	1,813,154	322,906	13,028,626	15,989,697	2,958,196
†TINNED, CANNED EXTRACTS (including TONGUE)—						
Beef	..	2,566,378	760,930	..	20,967,431	6,427,454
Mutton . . .	..	202,350	147,127	..	1,551,515	928,000
Other descriptions .	..	.	75,306	..	..	330,204
Total . .	..	2,768,728	983,363	..	22,518,946	7,685,658
†ALL OTHER KINDS—						
Tinned or Canned .	..	494,201	117,703	..	5,232,198	1,156,562
Salted . . .	..	15,512	5,219	..	105,510	35,502
Other descriptions .	..	1,121,880	147,452	.	5,543,197	615,542
Total . .	..	1,631,593	270,374	..	10,880,905	1,807,606
MEAT, preserved otherwise than by salting—						
Beef	1,867,653	..	..	16,069,557	..	..
Mutton . . .	39,705	..	..	291,977	..	..
Other sorts . .	231,292	..	..	2,856,634	..	..
Total . .	2,138,650	..	..	19,218,168	..	..
***MUTTON (fresh and refrigerated)—**						
Netherlands . .	..	..	54,413	..	..	407,113
Uruguay . . .	57,356	117,457	32,161	298,235	595,071	140,295
Argentine Republic .	707,250	974,848	758,734	3,592,080	4,957,883	3,441,635
Australia . . .	26,163	758,579	2,257,875	85,758	3,008,098	9,078,836
New Zealand . .	1,234,005	1,999,444	3,075,128	5,041,073	8,481,441	12,575,159
Other countries . .	61,374	224,628	229,619	256,500	915,563	1,173,914
Total . .	2,086,148	4,074,956	6,407,930	9,273,646	17,957,556	26,816,952
PORK (salted, not Bacon or Hams), from—						
Denmark . . .	..	..	4,314	..	..	10,926
United States . .	2,899	23,083	16,505	19,413	168,572	107,410
Other countries . .	8,792	991	2,673	58,098	7,016	16,878
Total . .	11,691	24,074	23,492	77,511	175,588	135,214
***PORK (fresh and refrigerated)—**						
Netherlands . .	..	..	31,276	..	..	326,957
United States . .	67,052	12,207	154,906	472,969	81,534	1,152,674
Other countries . .	32,602	123,982	316,007	213,004	818,441	2,156,468
Total . .	99,654	136,189	502,189	685,973	899,975	3,719,189
***RABBITS (dead), from—**						
Belgium . . .	..	..	1	..	..	6
Australia . . .	496,262	213,156	507,015	1,158,692	553,106	1,531,495
New Zealand . .	20,232	38,006	13,720	47,221	89,976	37,279
Other countries . .	48	4,561	5,234	120	18,059	28,924
Total . .	516,542	255,723	525,970	1,206,033	661,141	1,597,704

* In the Official Returns from 1909 the imports are shown separately as "Fresh," "Chilled," and "Frozen."

† Tongues, Hearts, Livers, Kidneys, &c , are included in "All other kinds" prior to 1920.

TABLE No. 11.—QUANTITIES AND VALUES OF BUTTER, MARGARINE, CHEESE, AND EGGS imported into the United Kingdom in each Year from 1918 to 1920 inclusive.

[*From Trade and Navigation Returns.*]

	Quantities.			Values.		
	1918.	1919.	1920.	1918.	1919.	1920.
BUTTER from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . .	...	6,954	19,308	...	87,608	280,654
Sweden . .	...	...	4	...	...	44
Denmark .	40,327	290,291	817,235	771,291	3,947,835	11,762,465
Netherlands .	9,885	1,641	102,567	164,317	20,812	1,583,482
France . .	4,770	2	8,934	73,989	16	120,444
United States .	196,593	216,495	50,897	2,436,265	2,746,908	680,210
Argentine Republic . .	313,143	265,675	138,862	3,797,050	3,344,218	2,038,594
Victoria . .	192,975	214,689	129,474	2,419,100	2,702,671	1,961,748
New S. Wales	198,751	118,974	75,084	2,471,646	1,493,664	999,769
Queensland .	122,769	73,858	19,389	1,519,689	930,668	263,577
New Zealand .	372,572	318,872	275,406	4,599,166	3,910,432	3,828,280
Canada . .	61,971	33,337	32,140	774,150	417,588	477,250
Other countries	64,902	19,421	47,044	743,075	252,012	637,782
Total .	1,578,658	1,560,204	1,716,344	19,769,738	19,854,427	24,634,294
MARGARINE from—	Cwt.	Cwt.	Cwt.	£	£	£
Netherlands .	301,600	458,148	853,263	1,563,079	2,223,017	5,231,870
France . .	...	..	2,430	...	...	19,115
Other countries	50	1,221	42,279	326	6,821	263,440
Total .	301,650	459,369	897,972	1,563,405	2,229,838	5,514,425
CHEESE from—	Cwt.	Cwt.	Cwt.	£	£	£
Netherlands .	87,896	79,217	112,196	621,496	668,289	724,204
Italy . .	..	180	951	...	3,529	19,222
United States .	472,328	16,169	73,216	3,308,257	125,127	518,006
Australia .	47,258	112,736	71,415	285,525	830,935	520,707
New Zealand .	610,655	1,239,553	1,260,642	3,849,695	8,455,199	9,279,901
Canada . .	1,125,668	647,212	1,129,758	7,695,411	4,894,738	8,814,530
Other countries	13,298	23,183	108,065	145,474	192,803	780,702
Total .	2,357,103	2,118,250	2,756,243	15,905,858	15,170,620	20,657,272
EGGS from—	Great Hundreds.	Great Hundreds.	Great Hundreds.	£	£	£
Russia . .	...	..	9,183	...	...	14,420
Denmark .	1,170,535	1,638,067	3,939,437	2,592,033	2,776,116	7,032,857
Germany .	...	..	6,960	...	...	11,112
Netherlands .	...	620	48,474	...	1,180	73,748
France . .	...	6,584	15,160	..	7,065	24,836
Italy . .	...	..	...	...	...	...
Austria Hugary } .	...	...	7,984	...	...	14,457
United States .	337,345	1,408,606	331,185	617,236	2,205,092	553,211
Egypt . .	729,807	758,728	566,498	715,170	930,674	597,208
Canada . .	388,985	1,476,962	807,281	666,864	2,230,422	1,478,933
Other countries	29,743	354,828	1,338,104	30,346	462,777	1,778,814
Total .	2,656,415	5,644,395	7,070,266	4,621,649	8,613,826	11,579,096

TABLE No. 12.—NUMBER OF LIVE STOCK IN 1917, 1918, AND 1919, returned as entering the Markets at the Places scheduled under the Markets and Fairs (Weighing of Cattle) Act, 1891.

[*From Agricultural Statistics*, 1919.]

	CATTLE.			SHEEP.			PIGS.		
	1917.	1918.	1919.	1917.	1918.	1919.	1917.	1918.	1919.
Aberdeen .	83,316	49,475	66,900	218,682	187,464	170,665	12,533	6,311	5,293
Dundee .	14,227	8,545	6,322	20,478	14,855	4,386	3,860	1,088	799
Edinburgh	59,394	40,750	40,306	198,439	165,578	103,411	7,642	1,306	344
Stirling .	61,601	56,077	56,869	224,515	214,276	191,183	6,052	3,144	3,790
Glasgow .	77,527	56,799	47,216	332,440	254,643	81,594	6,423	1,863	1,576
Perth . .	83,202	54,326	67,625	321,299	278,328	344,848	9,505	5,012	6,426
	379,267	265,972	285,238	1,315,854	1,115,144	896,087	46,015	18,724	18,228

TABLE No. 13.—AVERAGE PRICES OF FAT CATTLE PER CWT. (LIVE WEIGHT) at the undermentioned Places in each Year from 1912 to 1919, together with the average Prices for Scotland, England, and Great Britain, compiled from the Returns received under the Markets and Fairs (Weighing of Cattle) Act, 1891.

	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
	s d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Aberdeen . . .	38 9	38 4	39 0			72 7	72 5	77 9
Dundee . . .	38 1	37 0	37 9		56 8			
Edinburgh . .	41 2	39 10	40 7	52 4	60 4	77 8	70 8	74 8
Glasgow . . .	39 7	38 9	39 10	52 1	59 8			
Perth . . .	42 2	40 7	41 3	54 4	62 1	79 9		81 4
SCOTLAND . . .	40 0	38 11	39 8					
ENGLAND . . .	37 9	38 11	39 8					
GREAT BRITAIN .	39 6	38 11	39 8					

TABLE No. 14.—NUMBER AND VALUE OF LIVE CATTLE, SHEEP, AND SWINE imported into the United Kingdom in the undermentioned Years. [*From Trade and Navigation Returns.*]

Figures not available.

	Number.			Value.		
	1917.	**1918.**	**1919.**	**1917.**	**1918.**	**1919.**
CATTLE, from—				£	£	£
Channel Islands . .	..	..	..	..	..	..
Canada	..	..	..	..	.	..
United States . .	..	..	..	..	..	..
Argentine Republic .	..	..	..	..	..	..
Other countries . .	..	..	..	..	..	..
Total . . .	..	..	.	..	..	..
SHEEP AND LAMBS, from—						
Canada	..	..	..	..	..	..
United States . .	..	..	..	..	..	..
Argentine Republic .	..	..	..	..	..	..
Other countries . .	..	..	.	..	..	..
Total . . .	..	..	.	..	.	..
SWINE (not separately enumerated)	..	..	..	..	..	..
TOTAL VALUE OF ANIMALS LIVING	..	..	..	..	..	..

TABLE No. 15.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS imported into Great Britain from Ireland in each of the Years 1914-1920.

	1914.	**1915.**	**1916.**	**1917.**	**1918.**	**1919.**	**1920.**
*HORSES :—							
Stallions . .	188	276	272	357	303	384	376
Mares . .	15,227	7,729	2,779	2,062	8,402	8,028	11,494
Geldings . .	15,338	9,806	3,827	3,183	11,376	13,370	12,849
Total . .	30,753	17,811	6,878	5,602	20,081	21,782	24,719
CATTLE : Oxen, Bulls, and Cows :—							
Fat . . .	455,444	363,272	423,733	404,787	375,705	581,842	452,481
Store . . .	448,703	440,995	442,745	394,865	289,694	104,781	390,049
Other cattle .	6,096	9,459	9,398	62,952	33,961	29,947	47,106
Calves . .	34,835	27,009	13,180	25,992	20,752	8,681	27,290
Total . .	944,578	840,735	889,056	888,596	720,112	765,251	925,926
SHEEP :—							
Sheep . . .	256,607	229,896	313,467	415,338	310,337	276,915	243,525
Lambs . .	280,932	259,495	323,270	347,773	304,036	230,230	331,215
Total . .	537,539	489,391	636,737	763,111	614,373	507,145	574,740
PIGS :—							
Fat . . .	146,458	171,963	263,989	185,958	165,712	192,540	158,872
Store . . .	1,464	7,093	14,158	13,373	4,597	3,778	7,750
Total . .	147,922	179,056	278,147	199,331	170,309	196,318	165,622

* Not including Army Horses.

EDINBURGH CORN-MARKET GRAIN TABLES for WHEAT, BARLEY, OATS, and BEANS, showing the Quantity offered for Sale, the Quantity Sold, the Highest, Lowest, and Average Prices; also the Bushel-weights as fixed by Government, likewise the Results for every Month, and the final Result for the year 1920.

WHEAT.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1920 Jan.						
Feb.						
March						
April						
May						
June						
July						
Aug.						
Sept.						

N.B.—The usual figures regarding grain prices are again not available for 1920, *but the following notes may be found useful.*

Control was still in force when the year opened, and the price was 76s. 6d., with conditions of sale precisely the same as in 1919. This price ruled till the month of June, when a somewhat unexpected advance took place—to the extent of 13s., raising the price to 89s. 6d., and this was maintained till the month of August, when a further 5s. 6d. was added, bringing it up to 95s., and continued at this figure till the early days of November. The conditions of sale were not affected by the advances.

At the beginning of November intimation was given to the millers that de-control had been decided upon, and an indication given as to when control would cease.

This led to a fall in prices, millers being willing to buy only in comparison to its relative value with other wheats; therefore during November best quality fell fully 5s. and secondary to a greater extent. December saw a further decline, good lots realising about 85s., with a greater difference for secondary grade, the likely average values for November being 90s. for best and 80s. overhead, for December 85s. for best and 74s. overhead.

The difference between the price obtained by the farmer during these months and the control price of 95s. is being paid over to them by the Government.

Wheat—*continued.*

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1920 Oct.						
Nov.						
Dec.						
Result for year						

BARLEY.

Date.	Quantity offered for Sale.	Quantity Sold	Highest Price.	Lowest Price.	Average Price.	Bushel Weights.
1920 Jan.						
Feb.						
March						

At the beginning of the year barley was a decidedly strong market, 130s. on rail being freely given for first-class parcels, and in a few exceptional cases even more money was paid.

February saw a slight back-set to the extent of roughly 5s., while March was considerably easier, the best qualities fetching round about 110s.

BARLEY—*continued*.

<table>
<tr><th>Date.</th><th>Quantity offered for Sale.</th><th>Quantity Sold.</th><th>Highest Price.</th><th>Lowest Price.</th><th>Average Price.</th><th>Bushel Weights.</th></tr>
<tr><td>1920
April</td><td colspan="6" rowspan="10">April, May, and June kept wonderfully steady at a variance of, say, 5s. less, while in August slightly over 110s. was procurable.

The new season crop struck a value for good quality of 90s. to 95s. on rail, and the market tended to harden up during October till 100s. was obtainable; but throughout November prices declined to the extent of 5s. to 7s. 6d., and December saw a gradual fall, so that the year closed with prices ranging from 75s. to 85s. on rail according to grade.

The depreciation during December was the result of a large quantity of inferior barley being forced on the market. Many transactions took place at very low prices, and a number of deliveries were refused owing to condition.</td></tr>
<tr><td>May</td></tr>
<tr><td>June</td></tr>
<tr><td>July</td></tr>
<tr><td>Aug.</td></tr>
<tr><td>Sept.</td></tr>
<tr><td>Oct.</td></tr>
<tr><td>Nov.</td></tr>
<tr><td>Dec.</td></tr>
<tr><td>Result for Year</td></tr>
</table>

OATS.

<table>
<tr><th>Date.</th><th>Quantity offered for Sale.</th><th>Quantity Sold.</th><th>Highest Price.</th><th>Lowest Price.</th><th>Average Price.</th><th>Bushel Weights.</th></tr>
<tr><td>1920
Jan.
Feb.
March
April
May
June
July
Aug.
Sept.
Oct.
Nov.
Dec.
Result for year</td><td colspan="6">The year opened with a fair demand for oats, 58s. to 60s. on rail being obtained, and a steady market existed during January and continued throughout February; but the values slackened somewhat in March, probably to the extent of 1s. or so. April regained this slight drawback, and hardening up rose, so that in early May fully 65s. was quite general.
Values steadily advanced during June, July, and August, so that 70s. to 75s., and even more, was obtainable before the new crop was in marketable condition.
During the spring there was a Continental demand for seed; but the quantity disposed of was less than last year, and a stricter selection in quality was evident. While this trade afforded an outlet for a certain quantity, it is questionable if it affected the market values to any extent.
During the year about 1000 qrs. were exposed on the floor of the market, chiefly at the end of May, and 70s. at Edinburgh was paid.
A considerable diversity of opinion exists as to the values quoted in the press, because the system of buying is not uniform. Some quote a f.o.r. price, others a price delivered, and the seller's commission is sometimes included, at other times excluded.
Many of the lower quotations publicly given are for oats grown a considerable distance away (north country, &c.) and represent an "on rail" price, so they give no indication of the true value of oats grown in the "Lothians."
The demand for the finer quality of the new crop was in the earlier stages quite good.
Starting at from 60s. to 65s. in September it eased off during October to the extent of 5s., and the November values receded to rather under 54s., while a considerable drop during December left the price at the close of the year in the region of 45s.
Unfortunately this decline was to a large extent caused by the extensive proportion of new crop oats being of an inferior quality (owing to unfavourable harvesting) and in such a condition as to preclude storing.
They had to be sold for immediate use, and such a surfeit of inferior grain tended to depress the market.
It may not be amiss to refer to a matter affecting both grower and buyer—that is, the condition in which the grain is marketed. In war-time millers had frequently to accept grain in anything but a well-dressed condition, but even under present circumstances complaints are made regarding the dirty, undressed state of deliveries.
The output cost being affected, millers naturally expect growers to make delivery in a proper condition. The growers will benefit as they will secure the best market value and likewise avoid delivery complaints.
The disadvantage of having no indication of the natural weight is also frequently referred to.</td></tr>
</table>

BEANS.

The trade in beans during the year was small, and like other grain, subject to the market fluctuations. During the latter six months the range was from 95s. down to 85s. carriage paid.

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.					Ewes.					Lambs.				
	s.	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*
1818	28	0	to	30	0	not quoted.					8	0	to	10	0
1819	25	0	„	27	0	15	0	to	17	0	10	6	„	12	0
1820	20	0	„	25	0	16	0	„	17	0	10	0	„	11	0
1821	18	0	„	20	0	14	0	„	16	0	7	6	„	8	0
1822	12	6	„	18	0	8	0	„	8	6	4	6	„	0	0
1823	13	6	„	18	0	7	0	„	10	6	5	6	„	6	0
1824	14	0	„	19	0	7	0	„	9	0	4	6	„	6	0
1825	29	0	„	32	0	15	0	„	19	0	9	0	„	10	6
1826	17	6	„	21	6	13	0	„	15	0	7	0	„	7	6
1827	15	0	„	24	0	not quoted.					7	0	„	8	0
1828	18	0	„	27	6	12	0	to	15	0	7	0	„	8	3
1829	18	0	„	24	0	12	6	„	14	0	7	0	„	8	6
1830	15	0	„	21	0	8	0	„	11	0	6	0	„	6	9
1831	18	0	„	25	0	9	0	„	13	0	7	0	„	8	0
1832	19	0	„	24	0	11	0	„	16	0	7	0	„	9	0
1833	22	0	„	31	0	18	6	„	20	0	8	0	„	11	3
1834	22	0	„	31	0	18	6	„	21	0	9	0	„	11	6
1835	22	0	„	27	6	18	0	„	20	6	8	0	„	11	0
1836	24	0	„	31	6	16	0	„	19	0	10	0	„	14	0
1837	19	0	„	28	0	14	0	„	19	0	10	0	„	18	0
1838	23	0	„	30	6	17	0	„	22	0	12	0	„	14	0
1839	23	0	„	31	0	14	0	„	19	0	0	0	„	18	0
1840	24	0	„	33	0	15	0	„	23	0	7	0	„	11	6
1841	23	0	„	30	0	14	0	„	22	0	8	0	„	12	0
1842	22	6	„	28	0	13	0	„	17	0	7	6	„	10	0
1843	19	0	„	25	0	8	0	„	12	0	5	0	„	8	0
1844	21	0	„	29	0	10	0	„	16	0	8	0	„	10	6
1845	23	0	„	33	0	13	0	„	20	0	8	0	„	13	0
1846	24	0	„	33	6	14	6	„	21	6	10	0	„	14	6
1847	24	0	„	35	0	18	0	„	24	0	11	6	„	15	0
1848	23	0	„	34	6	13	0	„	28	0	11	6	„	15	0
1849	21	0	„	30	2	12	0	„	21	0	0	0	„	14	0
1850	20	6	„	29	6	12	0	„	20	0	8	0	„	13	0
1851	21	6	„	31	0	13	0	„	21	0	8	9	„	14	0
1852	21	0	„	32	0	15	0	„	23	0	8	0	„	14	0
1853	26	6	„	38	0	17	0	„	28	6	9	0	„	17	0
1854	25	0	„	36	0	17	0	„	26	0	9	0	„	16	6
1855	28	6	„	36	0	16	0	„	25	0	10	0	„	17	0
1856	22	0	„	35	6	15	6	„	24	0	10	0	„	15	0
1857	24	0	„	36	0	14	6	„	26	0	10	6	„	14	6
1858	24	0	„	34	6	14	0	„	24	6	10	6	„	14	0
1859	25	0	„	34	6	16	0	„	25	0	10	3	„	14	9
1860	26	0	„	38	0	17	6	„	27	6	12	6	„	17	6
1861	25	0	„	38	6	16	0	„	28	0	9	0	„	16	0
1862	27	0	„	37	6	17	6	„	28	0	10	0	„	16	0
1863	25	0	„	38	6	19	0	„	28	6	10	6	„	16	0
1864	31	0	„	41	0	21	0	„	31	6	14	0	„	18	0
1865	32	6	„	44	0	22	6	„	33	6	14	6	„	20	0
1866	37	0	„	50	0	29	0	„	42	6	15	0	„	26	0
1867	26	0	„	58	0	18	0	„	25	6	12	0	„	16	0
1868	30	0	„	32	0	15	6	„	21	0	7	6	„	13	0
1869	28	0	„	38	0	15	0	„	22	6	7	6	„	14	0
1870	35	6	„	43	0	18	0	„	28	0	10	0	„	17	0
1871	36	6	„	49	0	22	0	„	33	6	14	0	„	20	0
1872	45	0	„	56	0	32	0	„	42	0	16	0	„	22	0
1873	42	0	„	51	0	25	0	„	42	0	15	6	„	22	0
1874	33	6	„	44	6	21	0	„	36	0	12	0	„	17	0
1875	33	0	„	48	6	21	0	„	34	0	13	6	„	23	6
1876	40	0	„	52	6	23	0	„	30	0	18	6	„	25	0
1877	41	0	„	51	0	25	0	„	37	0	15	0	„	24	0
1878	35	6	„	48	0	23	6	„	35	0	14	0	„	22	0
1879	34	0	„	44	0	21	0	„	34	0	14	0	„	20	0
1880	30	0	„	48	6	20	0	„	30	0	12	6	„	20	0
1881	32	0	„	45	6	29	0	„	34	0	14	0	„	20	0
1882	40	0	„	51	0	30	0	„	40	0	14	0	„	20	6
1883	44	0	„	55	6	34	6	„	46	6	15	6	„	23	0
1884	36	0	„	47	6	29	6	„	41	6	12	6	„	20	0
1885	30	0	„	33	0	24	0	„	31	0	12	0	„	18	0
1886	32	0	„	40	0	21	0	„	29	0	12	6	„	19	0
1887	29	0	„	36	0	18	0	„	26	0	11	0	„	16	6
1888	30	0	„	33	0	19	0	„	27	0	12	0	„	17	6

TABLE No. 1.—CHEVIOT SHEEP—*Continued.*

Year.	Wethers.					Ewes.					Lambs.				
	s.	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*	*s.*	*d.*		*s.*	*d.*
1889	36	0	to	44	0	24	0	to	32	0	14	0	to	22	0
1890	31	0	"	40	0	22	0	"	30	0	12	6	"	20	0
1891	27	0	"	33	0	16	0	"	25	0	9	0	"	16	0
1892	22	0	"	30	6	18	0	"	22	0	5	0	"	11	0
1893	26	0	"	35	6	18	0	"	28	6	8	6	"	15	0
1894	26	0	"	37	0	20	0	"	31	0	10	6	"	18	6
1895	28	0	"	39	0	22	0	"	34	0	11	6	"	19	6
1896	24	6	"	34	0	19	0	"	30	6	9	0	"	16	6
1897	27	0	"	36	0	21	0	"	31	6	11	0	"	17	6
1898	27	0	"	37	0	22	0	"	32	6	12	0	"	18	6
1899	24	0	"	33	0	20	0	"	30	6	10	6	"	16	0
1900	26	0	"	36	0	22	0	"	32	6	12	0	"	17	0
1901	25	0	"	32	6	20	0	"	29	6	11	0	"	16	0
1902	24	0	"	31	6	18	0	"	27	0	9	6	"	14	6
1903	26	0	"	34	0	21	0	"	31	0	11	4	"	18	0
1904	28	6	"	36	6	23	0	"	32	6	13	0	"	20	0
1905	27	6	"	35	0	23	0	"	33	0	14	0	"	21	0
1906	30	0	"	38	0	26	0	"	34	6	15	0	"	23	0
1907	28	0	"	34	0	22	0	"	30	6	13	6	"	19	6
1908	26	0	"	32	6	21	0	"	27	6	11	6	"	17	0
1909	24	0	"	31	0	18	0	"	25	6	9	6	"	16	0
1910	27	0	"	35	0	22	0	"	31	0	12	0	"	20	0
1911	24	0	"	31	6	18	6	"	27	6	10	6	"	18	0
1912	26	0	"	34	6	22	0	"	31	0	13	0	"	21	0
1913	30	0	"	39	0	24	0	"	35	6	16	0	"	24	0
1914	32	6	"	41	0	28	0	"	39	0	18	0	"	27	6
1915	36	0	"	46	0	31	0	"	44	0	20	0	"	30	6
1916	40	6	"	51	0	34	0	"	49	0	22	0	"	34	6
1917	43	6	"	56	0	38	0	"	56	0	24	0	"	34	0
1918	50	0	"	66	0	42	0	"	61	0	25	0	"	37	0
1919	53	0	"	69	0	44	6	"	67	0	28	0	"	40	6
1920	56	0	"	91	0	48	0	"	79	0	34	0	"	49	0

TABLE No. 2.—BLACKFACE SHEEP.

Year.	Wethers.					Ewes.					Lambs.				
	s.	*d.*		*s.*	*d.*	*s.*	*d.*		*s*	*d.*	*s.*	*d.*		*s.*	*d.*
1819	22	0	to	24	0	12	0	to	15	0	8	0	to	9	0
1820	20	0	"	23	3	15	6	"	17	0	7	0	"	8	6
1821	18	0	"	20	0	12	0	"	13	0	6	0	"	7	0
1822	11	6	"	13	6	5	6	"	6	0	4	6	"	0	0
1823	12	0	"	16	0	5	0	"	6	6	4	0	"	5	3
1824	9	6	"	13	6	6	0	"	7	0	4	0	"	5	0
1825	22	0	"	26	0	11	0	"	13	6	6	0	"	9	0
1826	15	0	"	17	0	8	0	"	9	0	4	6	"	6	0
1827	14	0	"	18	6	7	0	"	10	0	6	0	"	7	6
1828	15	0	"	20	0	8	0	"	11	0	5	0	"	7	6
1829	14	0	"	18	0	9	0	"	10	0	6	0	"	7	0
1830	9	6	"	13	0	4	0	"	6	0	4	6	"	6	0
1831	13	0	"	17	0	5	0	"	7	6	5	0	"	6	6
1832	14	0	"	18	0	7	0	"	11	6	6	0	"	7	8
1833	16	0	"	24	0	7	6	"	12	0	6	6	"	9	0
1834	16	0	"	22	0	10	0	"	13	0	6	0	"	8	6
1835	15	0	"	18	9	10	0	"	18	0	7	0	"	8	0
1836	15	0	"	21	0	9	0	"	12	0	8	6	"	11	0
1837	13	0	"	16	0	8	0	"	12	0	8	0	"	9	6
1838	15	0	"	20	6	10	0	"	13	0	not quoted				
1839	15	0	"	22	0	10	0	"	12	0	7	0	to	8	3
1840	15	0	"	22	6	11	0	"	12	0	7	0	"	9	3
1841	16	0	"	20	0	9	0	"	11	0	6	0	"	8	0
1842	14	0	"	19	0	7	6	"	8	0	5	6	"	7	0
1843	not quoted.					4	9	"	6	6	not quoted.				
1844	15	0	to	21	0	6	6	"	10	0	5	0	to	8	0
1845	14	0	"	23	0	8	0	"	12	0	6	0	"	8	0
1846	13	0	"	24	0	10	0	"	13	0	8	0	"	9	0
1847	20	6	"	25	0	10	0	"	14	0	8	6	"	9	6
1848	20	0	"	24	0	11	3	"	12	0	8	6	"	10	0
1849	not quoted.					not quoted.					7	0	"	7	6
1850			..					..			7	0	"	0	0
1851	17	6	to	23	0	9	0	to	12	0	6	6	"	8	0
1852	18	6	"	22	0	9	6	"	12	0	4	6	"	7	9
1853	23	0	"	27	0	14	6	"	16	6	8	0	"	11	6
1854	20	0	"	26	0	11	0	"	16	6	8	0	"	10	6
1855	23	6	"	26	6	14	0	"	16	0	10	0	"	11	0
1856	17	0	"	24	0	10	0	"	20	0	7	6	"	10	0
1857	20	0	"	29	0	10	6	"	15	0	9	3	"	11	0
1858	20	0	"	27	6	9	9	"	18	9	8	3	"	10	6
1859	23	9	"	25	0	10	0	"	14	0	8	9	"	11	0
1860	21	0	"	27	3	11	0	"	16	0	10	0	"	13	6
1861	21	0	"	29	0	12	0	"	22	0	6	3	"	14	0
1862	16	9	"	27	0	12	0	"	18	8	6	0	"	12	0

TABLE No. 2.—BLACKFACE SHEEP—*Continued.*

Year.	Wethers.					Ewes.					Lambs.				
	s.	d.		s.	d.	s.	d.		s.	d.	s.	d.		s.	d.
1863	20	0	to	30	6	13	0	to	16	0	8	0	to	11	6
1864	25	0	„	30	0	15	0	„	19	0	10	0	„	13	6
1865	15	6	„	32	6	15	0	„	25	0	10	0	„	17	0
1866	31	6	„	40	0	20	0	„	36	0	13	6	„	22	6
1867	20	0	„	30	6	14	0	„	22	0	7	6	„	13	6
1868	20	0	„	26	0	10	6	„	18	6	7	0	„	13	0
1869	22	0	„	28	0	11	0	„	14	0	6	9	„	9	0
1870	27	0	„	32	6	18	0	„	22	0	8	0	„	14	6
1871	23	0	„	37	0	13	0	„	23	0	11	0	„	16	3
1872	31	6	„	45	0	18	0	„	32	0	12	6	„	18	0
1873	28	0	„	39	0	16	6	„	27	0	7	0	„	16	0
1874	25	0	„	35	0	18	0	„	20	0	7	0	„	14	6
1875	26	6	„	37	6	15	0	„	21	3	9	6	„	17	6
1876	30	0	„	40	0	19	0	„	24	0	13	0	„	20	6
1877	35	0	„	38	9	18	0	„	25	0	18	6	„	23	0
1878	30	0	„	36	0	17	0	„	23	0	12	0	„	22	0
1879	25	0	„	35	9	16	0	„	24	0	10	6	„	20	0
1880	25	0	„	38	0	16	6	„	22	6	10	0	„	17	0
1881	30	0	„	39	0	15	0	„	23	0	10	0	„	15	0
1882	33	0	„	46	0	20	0	„	28	0	12	6	„	18	6
1883	36	0	„	50	6	24	6	„	33	0	14	0	„	21	6
1884	29	0	„	43	6	19	6	„	28	0	12	0	„	19	6
1885	24	0	„	34	0	18	0	„	22	6	10	0	„	15	0
1886	25	0	„	34	0	12	0	„	22	0	10	6	„	16	0
1887	22	0	„	30	0	11	0	„	19	0	8	0	„	13	0
1888	22	0	„	32	0	13	0	„	24	0	10	0	„	15	0
1889	26	0	„	40	0	18	0	„	29	0	13	0	„	22	0
1890	24	0	„	37	0	14	0	„	27	0	10	6	„	19	0
1891	21	0	„	37	0	10	0	„	24	0	7	6	„	15	0
1892	16	0	„	28	6	6	0	„	17	0	3	0	„	10	0
1893	21	0	„	37	0	12	0	„	24	0	7	0	„	14	6
1894	20	0	„	37	6	14	6	„	26	6	8	6	„	16	0
1895	28	0	„	41	0	16	0	„	28	6	9	0	„	17	0
1896	19	0	„	35	4	13	0	„	24	0	6	0	„	13	6
1897	21	0	„	36	6	15	0	„	25	6	7	0	„	14	6
1898	22	0	„	37	0	16	0	„	26	6	8	0	„	15	0
1899	20	0	„	33	6	13	0	„	24	0	5	6	„	13	0
1900	23	0	„	36	0	16	0	„	26	6	8	0	„	15	6
1901	20	0	„	35	0	14	0	„	25	6	6	6	„	14	6
1902	18	6	„	34	0	12	0	„	24	0	6	0	„	14	0
1903	21	0	„	36	0	15	0	„	28	0	7	0	„	16	6
1904	23	0	„	38	6	18	0	„	30	0	8	6	„	17	6
1905	21	6	„	37	0	19	0	„	31	0	9	0	„	18	6
1906	23	0	„	38	0	20	0	„	33	0	10	0	„	19	6
1907	21	0	„	33	6	17	0	„	28	0	8	6	„	17	6
1908	19	6	„	30	0	15	0	„	24	6	8	0	„	16	0
1909	17	0	„	28	0	11	6	„	22	0	6	3	„	13	0
1910	21	0	„	32	6	16	0	„	27	6	8	0	„	17	0
1911	19	0	„	29	6	14	0	„	24	0	7	0	„	15	0
1912	21	6	„	32	6	17	0	„	27	6	9	6	„	17	6
1913	24	6	„	36	0	21	0	„	31	0	12	6	„	21	6
1914	27	0	„	38	6	25	0	„	34	6	15	6	„	24	0
1915	31	0	„	42	6	29	0	„	39	6	17	0	„	25	6
1916	33	0	„	46	6	31	0	„	42	0	19	0	„	27	6
1917	36	0	„	51	0	33	0	„	47	0	21	0	„	30	0
1918	41	0	„	56	0	36	0	„	50	0	27	0	„	33	0
1919	44	0	„	62	0	39	0	„	54	0	29	0	„	36	0
1920	46	0	„	86	0	44	0	„	62	0	31	0	„	43	0

TABLE No. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.					White Cheviot.	Laid Highland.					White Highland.
	s.	d.		s.	d	s. d. s. d.	s.	d.		s.	d.	s. d. s d
1818	40	0	to	42	2	..	20	0	to	22	6	..
1819	21	0	„	22	0	..	10	0	„	10	3	..
1820	20	0	„	22	0	..	9	0	„	10	0	..
1821	18	0	„	20	0	..	9	0	„	10	0	..
1822	12	6	„	14	6	..	5	0	„	6	6	..
1823	9	0	„	10	6	..	5	0	„	5	9	..
1824	13	6	„	15	0	..	6	0	„	6	3	..
1825	10	6	„	22	0	..	10	0	„	10	6	..
1826	11	0	„	14	0	..	5	0	„	5	6	..
1827	11	0	„	14	0	..	5	6	„	6	9	..
1828	8	0	„	11	0	..	5	6	„	6	0	.
1829	8	6	„	11	0	..	4	3	„	0	0	..
1830	9	6	„	11	0	..	4	6	„	5	0	..
1831	17	0	„	20	0	..	7	6	„	8	6	..
1832	14	0	„	16	0	..	7	0	„	7	6	..
1833	18	0	„	20	7	..	10	0	„	11	0	..
1834	21	0	„	24	6	..	5	6	„	7	0	..
1835	19	0	„	20	6	..	9	6	„	10	8	..
1836	21	0	„	25	0	..	10	0	„	14	0	..
1837	12	0	„	14	0	..	7	0	„	7	8	..

TABLE NO. 3.—PRICE OF WOOL—*Continued.*

Year.	Laid Cheviot.	White Cheviot.	Laid Highland.	White Highland.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
1838	19 0 to 22 6	..	6 0 to 10 0	..
1839	18 0 " 20 0	..	8 0 " 12 0	..
1840	15 0 " 0 0	..	7 0 " 0 0	..
1841	15 0 " 16 9	..	6 0 " 7 5	..
1842	12 6 " 14 0	..	not quoted.	..
1843	9 0 " 11 6	..	5 0 to 6 0	..
1844	15 0 " 18 0	..	not quoted.	..
1845	14 6 " 17 6	..	7 6 to 8 6	..
1846	12 0 " 14 6	..	8 0 " 8 6	..
1847	12 6 " 14 0	..	not quoted.	..
1848	9 6 " 11 0	..	4 9 to 0 0	..
1849	12 0 " 16 6	..	6 0 " 6 3	..
1850	15 0 " 17 6	..	8 0 " 8 6	..
1851	12 0 " 16 0	..	8 0 " 9 3	..
1852	13 0 " 15 0	..	8 0 " 9 0	..
1853	19 0 " 22 0	..	11 0 " 12 6	..
1854	12 0 " 15 0	..	7 6 " 8 6	..
1855	14 6 " 19 0	..	8 6 " 9 0	..
1856	19 0 " 21 6	..	11 0 " 0 0	..
1857	19 0 " 24 0	..	13 0 " 14 3	..
1858	15 0 " 17 0	..	8 9 " 10 0	..
1859	18 6 " 24 0	..	10 9 " 11 6	..
1860	22 0 " 32 0	37 0 to 38 0	10 0 " 11 3	..
1861	19 6 " 27 0	from 30s. upwards	not quoted.	..
1862	18 6 " 26 0	30 0 to 37 0	11 6 to 16 0	..
1863	25 6 " 31 0	38 0 " 42 0	15 3 " 17 6	..
1864	31 0 " 39 0	47 0 " 54 0	17 6 " 20 0	..
1865	23 0 " 30 0	44 0 " 45 0	15 0 " 17 0	..
1866	24 0 " 30 0	30 0 " 38 0	14 0 " 16 0	..
1867	16 0 " 21 6	not quoted.	not quoted.	..
1868	19 0 " 26 0	28 0 to 32 0	8 6 to 9 0	..
1869	18 0 " 26 6	not quoted.	8 6 " 10 0	..
1870	15 0 " 23 6	25 0 to 26 0	9 6 " 0 0	..
1871	20 0 " 26 6	30 0 " 34 6	12 0 " 15 0	..
1872	26 0 " 37 6	40 0 " 48 0	18 0 " 21 0	..
1873	17 0 " 18 0	34 0 " 40 0	9 0 " 12 0	..
1874	18 6 " 26 6	30 0 " 34 0	9 6 " 13 0	..
1875	25 0 " 32 0	34 6 " 36 0	12 6 " 16 0	..
1876	20 0 " 24 0	30 0 " 34 6	9 6 " 12 0	..
1877	20 9 " 26 0	28 0 " 30 0	10 0 " 12 0	..
1878	18 9 " 25 0	27 0 " 32 0	8 6 " 11 6	..
1879	15 0 " 17 0	prices very low.	7 0 " 0 0	..
1880	20 0 " 24 0	30 0 to 32 0	10 6 " 11 6	14 0 to 15 0
1881	17 0 " 21 0	27 0 " 30 0	5 0 " 9 6	12 0 " 13 0
1882	14 0 " 18 0	27 6 " 28 0	7 6 " 9 0	13 0 " 14 0
1883	13 0 " 18 0	26 0 " 28 0	6 6 " 8 6	11 6 " 12 6
1884	13 0 " 18 0	26 0 " 28 0	6 6 " 8 6	11 6 " 12 6
1885	12 0 " 17 0	22 6 " 26 0	6 0 " 8 0	11 6 " 12 0
1886	13 0 " 18 0	23 0 " 27 6	6 6 " 8 6	11 6 " 12 0
1887	14 0 " 22 0	23 0 " 28 0	7 0 " 9 0	11 6 " 13 0
1888	13 0 " 20 0	23 0 " 28 0	7 0 " 9 0	11 0 " 12 6
1889	13 0 " 18 0	24 0 " 28 0	7 0 " 9 0	11 0 " 12 6
1890	13 0 " 18 0	24 0 " 28 0	7 0 " 9 0	11 0 " 12 6
1891	12 6 " 18 0	22 0 " 28 0	7 0 " 9 0	11 0 " 12 6
1892	12 0 " 18 0	20 0 " 28 0	7 0 " 8 6	10 6 " 12 0
1893	12 0 " 17 0	20 0 " 27 0	7 0 " 8 0	10 0 " 12 0
1894	12 0 " 16 0	20 0 " 26 0	7 0 " 8 0	10 0 " 12 0
1895	12 0 " 16 0	20 0 " 25 0	7 0 " 8 0	10 0 " 11 6
1896	11 0 " 15 0	19 0 " 24 0	7 0 " 8 0	10 0 " 11 6
1897	11 0 " 14 0	18 0 " 23 0	7 0 " 8 0	10 6 " 12 0
1898	10 0 " 13 0	16 0 " 20 0	7 0 " 8 0	10 0 " 11 6
1899	10 0 " 13 0	13 0 " 18 6	7 0 " 8 0	8 6 " 9 6
1900	9 9 " 12 0	13 0 " 18 6	6 9 " 7 9	8 0 " 9 6
1901	9 0 " 10 0	11 0 " 16 6	5 9 " 6 6	8 0 " 9 0
1902	9 0 " 10 0	11 6 " 17 0	6 0 " 6 6	8 6 " 9 6
1903	10 0 " 12 0	15 0 " 18 0	7 0 " 8 0	11 6 " 12 6
1904	15 0 " 17 0	20 0 " 21 0	9 0 " 10 0	14 0 " 15 0
1905	17 0 " 20 0	24 0 " 26 0	10 0 " 11 0	15 0 " 16 0
1906	18 0 " 21 0	27 0 " 28 6	11 6 " 13 0	16 6 " 17 6
1907	*	22 0 " 24 0	11 0 " 12 6	16 0 " 17 0
1908	*	16 0 " 18 0	†	8 0 " 8 6
1909	*	24 0 " 26 0	†	12 6 " 14 0
1910	*	25 0 " 30 0	†	13 0 " 14 6
1911	*	25 0 " 30 0	†	13 0 " 14 6
1912	*	24 0 " 29 0	†	14 0 " 15 0
1913	*	25 0 " 30 0	†	17 0 " 18 0
1914	*	24 0 " 29 0	†	15 0 " 15 6
1915 ‡	*	42 0 " 46 0	†	21 0 " 22 0

PRICE OF WOOL PER STONE OF 24 LB.—*Continued.*

	CHEVIOT.				HALF-BRED.				BLACK-FACE.		CROSS-BRED (BLACKFACE EWE AND LEICESTER RAM).			
	HOGG.		EWE AND WETHER.		HOGG.		EWE AND WETHER.		HOGG.	EWE AND WETHER.	HOGG.		EWE AND WETHER.	
	Washed.	Un-washed.	Washed.	Un-washed.	Washed.	Un-washed.	Washed.	Un-washed.			Washed.	Un-washed.	Washed.	Un-washed.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
[1] 1916 . . .	36 6	30 0	33 0	27 6	34 6	28 6	33 0	27 6	23 0	23 0	28 6	25 6	28 6	25 6
CAITHNESS & SUTHERLAND	40 0	32 6	34 0	29 0	35 0	29 0	34 0	28 6						
[1] 1917 . . .	40 6	33 0	37 0	31 0	38 6	31 6	37 0	31 0	25 6	25 6	31 6	28 6	31 0	28 6
CAITHNESS & SUTHERLAND	44 6	36 0	37 6	32 6	39 0	32 6	37 6	31 6						
[1] 1918 . .	43 6	35 6	39 6	33 0	41 0	33 6	39 6	33 0	27 0	27 0	33 6	30 6	33 6	30 6
CAITHNESS & SUTHERLAND	47 6	38 6	40 0	34 6	41 6	34 6	40 0	33 6						
1919 . . .	84 0	70 0	82 0	66 0	82 0	62 0	70 0	58 0	34 0	34 0	46 0	39 0	44 0	38 0
CAITHNESS & SUTHERLAND	88 0	74 0	84 0	68 0	84 0	63 0	72 0	60 0						
1920 . . .	86 0	70 0	83 0	66 0	74 0	54 0	65 0	50 0	24 0	24 0	35 0	29 0	34 0	27 0
CAITHNESS & SUTHERLAND	90 0	74 0	87 0	68 0	76 0	56 0	68 0	52 0						

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[1] The prices given were prices fixed by Government, and not free market prices.

2. HORSES.

DRAUGHT STALLIONS.

47. Aged stallions	12	
48. Three-year-old entire colts	13	
49. Two-year-old entire colts	21	
50. One-year-old entire colts	18	
	—	64

DRAUGHT GELDINGS.

51. Aged geldings	6	
52. Three-year-old geldings	7	
53. Two-year-old geldings	8	
	—	21

DRAUGHT MARES AND FILLIES.

54. Mares with foal at foot	10	
55. Yeld mares, foaled before 1917	11	
56. Three-year-old yeld mares, or fillies	10	
57. Two-year-old fillies	15	
58. One-year-old fillies	16	
	—	62

HUNTERS.

59. Hunter brood mares, with foal at foot	...	
60. Yeld mares, fillies, or geldings, for field, foaled in 1917, in hand	3	
61. Yeld mares, fillies, or geldings, for field, foaled in 1918, in hand	3	
62. Colts, geldings, or fillies, foaled in 1919, the produce of thoroughbred stallions or registered hunter sires, out of mares of any breed	2	
	—	8

HACKNEYS.

63. Brood mare, over 14 hands, with foal at foot or to foal this season to a registered sire	* 2	
64. Yeld mares or fillies, three years old	2	
65. Entire colts or fillies, foaled in 1918	1	
66. Entire colts or fillies, foaled in 1919	1	
67. Stallion foaled in or before 1917, over 14 hands	4	
Extra Stock	3	
	—	13

PONIES.

68. Stallion, 3 years old and upwards, 14 hands and under	1	
69. Yeld mares, fillies, or geldings, 3 years old and upwards, over 13 and not over 14 hands, in saddle	1	
70. Yeld mares, fillies, or geldings, 3 years old and upwards, not over 13 hands, in saddle	1	
	—	3

HIGHLAND PONIES.

71. Stallions, 3 years old or upwards, not exceeding 14·2 hands	3	
72. Mares, 3 years old or upwards, not exceeding 14·2 hands, yeld or with foal at foot	10	
73. Entire colts, foaled after 1st January 1918	2	
74. Fillies foaled after 1st January 1918	3	
		18

WESTERN ISLAND PONIES.

75. Stallions, 3 years old or upwards, not exceeding 14·2 hands	...	
76. Mares, 3 years old or upwards, not exceeding 14·2 hands, yeld or with foal at foot	9	
77. Entire colts, foaled after 1st January 1918	1	
78. Fillies, foaled after 1st January 1918	1	
	—	1

SHETLAND PONIES.

79. Stallions, not exceeding 10½ hands, foaled before 1917	8	
80. Entire colts, not exceeding 10½ hands, foaled in 1917 or 1918	6	
81. Mares, not exceeding 10½ hands, with foal at foot	11	
82. Yeld mares, not exceeding 10½ hands	10	
83. Fillies, not exceeding 10½ hands, foaled in 1917 or 1918	8	
		43

HORSES IN HARNESS.

4. Yeld mares, fillies, or geldings, any age, in harness, 15 hands and upwards, to be driven in the ring (6)	4	
5. Yeld mares, fillies, or geldings, any age, in harness, under 15 hands, to be driven in the ring (4)	3	
		7
		250

JUMPING.

1. Horses or ponies, any height	9
2. Horses or ponies, any height—handicap	9
3. Horses or ponies, any height—handicap	9
4. Horses or ponies, any height	9
5. Horses or ponies, any height	9
	45

3. SHEEP.

BLACKFACE.

86. Tups above one shear	17	
87. Shearling tups	18	
88. Shearling tup, which shall have been entirely out-wintered, and which shall not have been clipped before 1st May 1920	13	
89. Ewes above one shear, with lambs at foot	14	
Extra stock	1	
90. Shearling ewes or gimmers	12	
		75

CHEVIOT.

91. Tups above one shear	12	
92. Shearling tups	17	
93. Ewes above one shear, with lambs	10	
94. Shearling ewes or gimmers	12	
		51

BORDER LEICESTER.

95. Tups above one shear	10	
96. Shearling tups	30	
97. Ewes above one shear	10	
98. Shearling ewes or gimmers	16	
		66

HALF-BRED.

99. Tups above one shear	1	
100. Shearling tups	2	
101. Ewes above one shear	3	
102. Shearling ewes or gimmers	5	
103. Three ewe lambs	2	
		13

OXFORD DOWN.

104. Shearling tups	12	
105. Shearling ewes or gimmers	12	
106. Tup lambs	9	
107. Three ewe lambs	3	
Extra stock	1	
	—	37

SUFFOLK.

108. Shearling tups	3	
109. Shearling ewes or gimmers	7	
110. Tup lambs	8	
111. Three ewe lambs	5	
	—	23

SHROPSHIRE.

112. Shearling tups	4	
113. Shearling ewes or gimmers	4	
	—	8

FAT SHEEP.

114. Three fat lambs, any breed or cross	6	
	—	6
		279

4. GOATS.

OPEN CLASSES.

115. Male goats, any variety, over one year	5	
116. Female goats, any variety, over two years	3	
117. Goatlings, any variety, over one and not exceeding two years	3	
118. Male kid, any variety, not exceeding one year, entered or eligible for entry in the Herd-Book	3	
119. Female kids, any variety, not exceeding one year	4	
120. Milking competition, open to Classes 116 and 122 (animals two years and over) (3)	...	
	—	18

CONFINED TO SCOTTISH EXHIBITORS.

121. Male goats, one year old and over, any variety (5)	...	
122. Female goats, in milk, any age (3)	1	
	—	1
		19

5. PIGS.

LARGE WHITE.

123. Boars farrowed before 1919	11	
124. Boars farrowed in 1919	8	
125. Boars farrowed in 1920	7	
126. Sows farrowed before 1919	11	
Extra stock	1	
127. Sows farrowed in 1919	8	
128. Sows farrowed in 1920	9	
	—	55

MIDDLE WHITE.

129. Boar, any age	2	
130. Boar farrowed in 1920	2	
131. Sows, any age	2	
132. Sow farrowed in 1920	2	
	—	8

BERKSHIRE.

133. Boar, any age	2	
134. Boar farrowed in 1920	3	
135. Sow, any age	4	
136. Sow farrowed in 1920	4	
	—	13

LARGE BLACK.

137. Boar, any age	11	
138. Sow, any age	15	
139. Sow, farrowed in 1920	9	
Extra stock	1	
	—	36
		112

6. POULTRY.

1–109. Poultry	597

7. DAIRY PRODUCE.

1. Powdered butter, not less than 7 lb.	8	
2. Fresh butter, three 1-lb. rolls	14	
3. Cheddar cheese, 56 lb. and upwards	12	
4. Sweet-milk cheese, flat shape, white in colour, made according to the Dunlop or other method	1	
5. Cheese, 14 lb. and under	8	
	—	43

8. BEE APPLIANCES AND HONEY, &c.

OPEN CLASSES—APPLIANCES.

1. Collection of hives and appliances	3	
2. Best and most complete standard frame hive for general use, unpainted	3	
3. Best and most complete standard frame hive for cottager's use, unpainted	3	
4. Best exhibit showing improvements in hives and appliances	3	
	—	12

HONEY, &c.

5. Six sections of comb honey	7	
6. Six jars of run or extracted light-coloured honey	7	
7. Six jars of run or extracted medium or dark-coloured honey, excluding heather	5	
8. Six jars of pressed heather honey in liquid form	2	
9. Six jars of granulated honey	5	
10. One shallow frame of comb honey for extracting purposes	3	
11. Products made with the aid of honey	1	
12. Best display of honey in any form staged in space 3 feet by 3 feet, height from table not exceeding 4 feet	2	
13. Best exhibit of not less than 1 lb. of wax in any form	4	
14. Best exhibit of not less than 1 lb. of wax made into shape for retail trade and over-counter trade	1	
15. Observatory hive with queen and bees	5	
16. Exhibit of scientific nature	...	
	—	42

CONFINED TO SCOTTISH EXHIBITORS.

17. Six sections of comb honey	6	
18. Six jars of run or extracted medium or dark-coloured honey	4	
19. Six jars of run or extracted light-coloured honey	5	
	—	15
		69

9. WOOL.

Pure Breed Classes.

1.	Blackface ewe	4	
2.	Blackface wedder	3	
3.	Blackface hogg	4	
4.	Cheviot ewe	3	
5.	Cheviot hogg	3	
6.	Border Leicester ewe	...	
7.	Border Leicester hogg	1	
8.	Half-bred ewe	1	
9.	Half-bred hogg	1	
10.	Shetland ewe	9	
11.	Shetland hogg	7	
		—	36

ABSTRACT.

		No. of Entries
1.	Cattle	340
2.	Horses	250
3.	Sheep	279
4.	Goats	19
5.	Pigs	112
6.	Poultry	597
7.	Dairy produce	43
8.	Bee Appliances and Honey, &c.	69
9.	Wool	36
		1745

The following table gives a comparative view of the entries of cattle, horses, sheep, pigs, poultry, dairy produce, bee appliances and honey, &c., wool and implements, of the value of the premiums offered, and of the receipts at the entrance-gates, grand stands, and for catalogues at the Shows which have been held in the Aberdeen Show District :—

Year.	Cattle.	Horses.	Sheep.	Wool.	Swine	Goats.	Poultry.	Dairy Produce.	Bee Appliances, &c.	Implements.	Premiums.	Drawings at Show
1834 .	188	77	77	...	44	...	...	28	...	9	£627	£337
1840 .	269	80	51	...	40	...	...	46	...	30	781	586
1847 .	361	105	92	...	24	...	42	42	...	49	920	510
1858 .	450	189	281	...	47	...	122	...	...	802	1500	1229
1868 .	373	139	260	...	39	...	160	...	...	1158	1600	1577
1876 .	424	227	231	...	58	..	374	...	...	1812	2440	2899
1885 .	385	223	231	...	7	...	252	40	...	1849	2368	3436
1894 .	314	324	184	...	34	...	365	58	...	2532	2440	5121
1902 .	330	253	243	16	42	...	475	48	...	1988	2796	4413
1908 .	331	299	237	...	42	...	509	54	...	1931	3045	4596
1920 .	340	250	279	36	112	19	597	43	69	2065	4608	14,120

A Comparison.

The following figures relating to some of the most successful Shows the Society has held will be perused with interest :—

	Cattle.	Horses.	Sheep.	Pigs.	Poultry.	Total Live Stock.	Implements.	Premiums.	Drawings at Show.	Profit.
Glasgow, 1867 .	286	212	257	58	150	963	1344	£1600	£3,005	£1307
Edinburgh, 1869	310	212	340	22	239	1123	1900	1600	4,078	2067
Glasgow, 1875 .	411	405	296	48	479	1639	2220	2665	6,231	3316
Edinburgh, 1877	339	342	305	30	234	1250	2292	2714	6,734	3710
Edinburgh, 1884	580	453	493	35	253	1814	2282	4343	6,548	1855
Edinburgh, 1893	380	349	294	31	360	1414	2268	2600	4,918	2323
Aberdeen, 1894 .	314	324	184	34	365	1221	2532	2440	5,121	1678
Perth, 1896 .	292	258	204	20	374	1148	1945	2205	4,788	2511
Glasgow, 1897 .	317	350	245	30	275	1217	2227	2897	4,392	2021
Edinburgh, 1899	386	518	477	46	551	1978	2585	3844	10,285	3911
Stirling, 1900 .	321	288	369	28	457	1463	2095	2915	4,305	1078
Inverness, 1901 .	360	257	204	22	499	1340	1460	2806	2,485	99
Aberdeen, 1902 .	330	253	243	42	475	1343	1988	2796	4,413	1604
Perth, 1904 .	348	315	283	35	413	1394	1972	3058	4,993	1828
Glasgow, 1905 .	310	462	284	60	534	1750	1875	3702	4,473	1203
Peebles, 1906 .	253	258	291	40	438	1280	1658	3072	2,596	416
Edinburgh, 1907	363	464	352	58	605	1842	2140	3614	7,061	2309
Aberdeen, 1908 .	331	299	237	42	509	1418	1931	3045	4,596	1881
Stirling, 1909 .	330	355	249	54	539	1527	1977	3017	4,638	1100
Dumfries, 1910	270	355	295	54	481	1455	1950	3057	3,411	562
Paisley, 1913 .	408	472	334	48	536	1798	1968	5109	6,468	2527
Edinburgh, 1919	215	301	221	43	398	1178	1605	4517	17,377	3275

Cattle.

Considerable disappointment was expressed at the small exhibit of Shorthorns. There were 63 entries, compared with 43 at Edinburgh the previous year, but several animals were not forward. The quality of those exhibited was, however, very good. The President's Medal for the best Shorthorn went to Mr Albert James Marshall, Bridgebank, Stranraer, for his beautiful roan two-year-old bull "Inschfield Clipper King" (Fig. 29), got by "Vulcan of Naemoor," 134,187, out of "Crewe Clipper 2nd," and bred by Mr G. A. Bruce, Inschfield, Insch. This bull also won the Paisley Perpetual Gold Challenge Cup and the Shorthorn Society's Special Prize of £20 for the best bull. The runner-up for Championship honours, and the winner of the Shorthorn Society's Special Prize of £20 for females, was "Queen Pearl," a lovely red cow, the property of Mr William M'Allister, Drakies, Inverness, and bred by Mr J. W. Gordon Oswald of Aigas, Beauly.

There were 87 entries in the Aberdeen-Angus classes, and these provided one of the strongest displays which has been seen at the Show for many years. The President's Champion Medal, the Renfrewshire Perpetual Gold Challenge Cup, and the Ballindalloch Challenge Cup for the best bull, were won by Captain C. T. Scott, Buckland Manor, Broadway, Worcs., with his famous three-year-old bull "Etrurian of Bleaton," 41,498 (Fig. 30), bred by Mr James M'L. Marshall of Bleaton, Blairgowrie, and got by "Baron Beauford," 35,480, out of "Etruria of Bleaton," 52,860. The female classes contained many first-class animals, the leading place being taken by Mr James Kennedy's beautiful cow "Mendoza," 58,601, which won the Ballindalloch Challenge Cup for the best cow of the breed.

Galloway cattle, as was to be expected at a Show in the north, were not numerous, but there was no deficiency in character and quality. The champion was found in "Sapphire," 12,268 (Fig. 31), a six-year-old bull of impressive breed character, the property of Mr John Cunningham, Tarbreoch, Dalbeattie, bred by Messrs Thomas Biggar & Sons, Chapelton, Dalbeattie, and got by "Pure Gem," 11,356, out of "Lizzie 2nd of Chapelton," 19,464. Besides winning the President's Medal, this animal was awarded the Dr Gillespie Memorial Challenge Trophy.

Highland cattle also were not numerous, but some good animals were shown. The President's Champion Medal, and also the Perpetual Victory Challenge Cup for the best bull, given by the Highland Cattle Society, went to Mr A. K. M'Douall, Logan, Stranraer, for his two-year-old stylish brindled bull "Carrick Sir Douglas" (Fig. 32), bred by Exhibitor, and got by "Carrick Cluaidh," 2680, out of "Carrick Sgeathach," 7986. The Perpetual Victory Challenge Cup for the best female was won by the Earl of Southesk, with the home-bred "Princess Caroline II." a beautiful yellow two-year-old heifer, got by "Asgard," 2377, out of "Princess Caroline," 7392.

In the Ayrshire classes there was a fair entry, but some animals were not forward. The average quality was good. Mrs Houison-Crauford, Dunlop House, Dunlop, was awarded the President's Champion Medal, and also the Special Prize of £10 given by the Ayrshire Cattle Herd-Book Society for the best male animal, for her handsome two-year-old bull "Howie's Hot Stuff," 17,895 (Fig. 33), bred by Mr Thomas Logan, Low Milton, Maybole, and got by "Howie's Blockade," 15,275, out of "Caeston Mary Ann," 41,328. The Breed Society's Special Prize of £10 for the best female went to Mr William Hodge, Slodahill, Lockerbie, for his stylish home-bred seven-year-old cow "Slodahill Alice II.," A6634.

Shetland cattle were disappointing in regard to numbers, especially seeing that the Show was held at the most convenient point to the home of the breed. There were, however, several representatives of the best type of Shetlander. The President's Medal was won by Mr William J. Mackay, Castlepark, Lerwick, with his seven-year-old black cow "Black Bess" (Fig. 34), a typical specimen of a Shetland cow, and bred by Mrs Cumming, Staneydale, Walls, Shetland.

British Friesians, with 63 entries, provided a first-rate display, and the average standard of breed character and general merit was very high. The President's Medal was awarded to "Lochlands Pel Naspa" (Fig. 35), a yearling heifer of exceptional quality, the property of and bred by Mr Adam Smith, Lochlands, Larbert, and got by "Cradlehall (Imp.) Hollander 2nd," 3737, out of "Lochlands Nemo," 15,340.

There was a small but good show of fat cattle. The President's Champion Medal was won by Mr A. W. Howison, Lochbank, Blairgowrie, with a home-bred yearling Aberdeen-Angus Shorthorn heifer (Fig. 36).

Horses.

Draught Horses, as was to be expected at Aberdeen, provided an excellent display. The classes for Aged Stallions and Two-year-old Colts were particularly strong. The Champion Medal for best Clydesdale Stallion or Colt was awarded to Mr Andrew M. Montgomerie of Nether Hall, Castle Douglas, for "Fyvie Sensation," 20,042 (Fig. 37), a beautiful two-year-old colt, got by "Hiawatha Again," 18,765, out of "Lady Ivo," 40,779, and bred by Messrs J. & P. Donald, Lethen, Fyvie.

There was a good show of Draught Geldings. The President's Champion Medal was won by the Scottish Co-operative Wholesale Society, Ltd., Glasgow, with "Bob" (Fig. 38), a powerful four-year-old by "Arngibbon," bred by Mr Forsyth, Smailholm, Kelso.

Draught Mares and Fillies were also extremely good. The President's Champion Medal, the Fife and Kinross Gold Challenge Cup, and the Cawdor Challenge Cup, given by the Clydesdale Horse Society, were won by Mr F. L. Wallace of Balcairn, Old Meldrum, with his beautifully proportioned stylish four-year-old mare "Veda," 48,672 (Fig. 39). This mare was bred by Mr Robert Bryan, Orchardton, Cumnock, and got by "Dunure Footprint," 15,203, out of "Montrave Rosina," 32,283.

There was a small turn-out of Hunters. Mr Moffat S. Thomson, Spotsmains, Kelso, secured the President's Medal, and also the Champion Gold Medal given by the Hunters' Improvement Society for the best Hunter Filly, with "Flannelette," 5681 (Fig. 40), a nice chestnut two-year-old filly, bred by Exhibitor, and got by "Hunty Gowk," 81, out of "Pyjamas," 5320.

Hackneys were also a small display, but the quality was good. The Champion Medal here went to Mr Walter Briggs, Linden Hall, Borwick, Lancashire, for his famous seven-year-old dark chestnut "Adbolton Kingmaker," 12,274 (Fig. 41), bred by Mr A. W. Hickling, Wing Old Hall, Oakham, and got by "King's Proctor," 11,102, out "Adbolton St Mary," 18,848. The runner-up and winner of the Hackney Horse Society's Champion Prize of £10 for best mare or filly was "Slashing Dorothy," 23,769, the property of Sir Lees Knowles, Bart., C.V.O., Westwood, Pendlebury.

Only three Ponies were entered, and Mr J. E. Kerr of Harviestoun Castle, Dollar, secured the President's Medal with "Masquerader" (Fig. 42), a nice brown four-year-old by "Mathias," 6473, out of "Tissington Allegro," 5402, and bred by Exhibitor.

There was a satisfactory entry of Highland Ponies, eighteen animals being entered in four classes. Miss Kathleen Mackenzie of Farr, Daviot, Inverness-shire, won the President's Medal with "Starlight" (Fig. 43), a beautiful yellow dun six-year-old mare, bred by Mr W. D. Mackenzie of Farr, and got by "Glenbruar," 331, out of "Slioch," 2163. This mare also won the Special Prize of £10, 10s. given by the late Mr John C. Robertson, Fodderty.

Western Island Ponies had eleven entries. Nine of these were in the class for mares. The President's Medal went to Miss H. M. Duguid, Manar, Inverurie, for "Morar," 3035 (Fig. 44), a brown twelve-year-old mare, bred by Miss Norah Mackenzie, Calgary, Isle of Mull, and got by "Islesman," 253, out of "Boisdale," 1296.

All the classes for Shetland Ponies were well filled, there being forty-three entries in all. The standard of quality was, as usual, extremely good. Mr P. F. Manson, Maryfield, Bressay, Lerwick, won the President's Medal with "Bright Blossom" 3109 (Fig. 45), a beautiful black mare, ten years old, bred by Exhibitor, and got by "Erling," 448, out of "Rosalie," 2498.

There was a small entry of Harness Horses. The President's Medal went to Mr William S. Miller of Balmanno Castle, Bridge of Earn, for his well-known five-year-old gelding "V.C." (Fig. 46), bred by Mr Robert Scott, Thornhome, Carluke, and got by "Mathias," 6473, out of "Golden Glow."

The Jumping Competitions, as usual, provided a popular and attractive display.

Sheep, Pigs, &c.

There was an excellent exhibit of Sheep, all the Scottish breeds being strongly represented. Pigs were also a capital display, a new section for Large Blacks being well filled with animals of a fair standard of merit. Goats were not so numerous as at Edinburgh in 1919. The winners of the President's Champion Medals are shown in Figs. 47-58.

There was also a first-rate display in the sections for Poultry, Dairy Produce, Wool, and Bee Appliances and Honey.

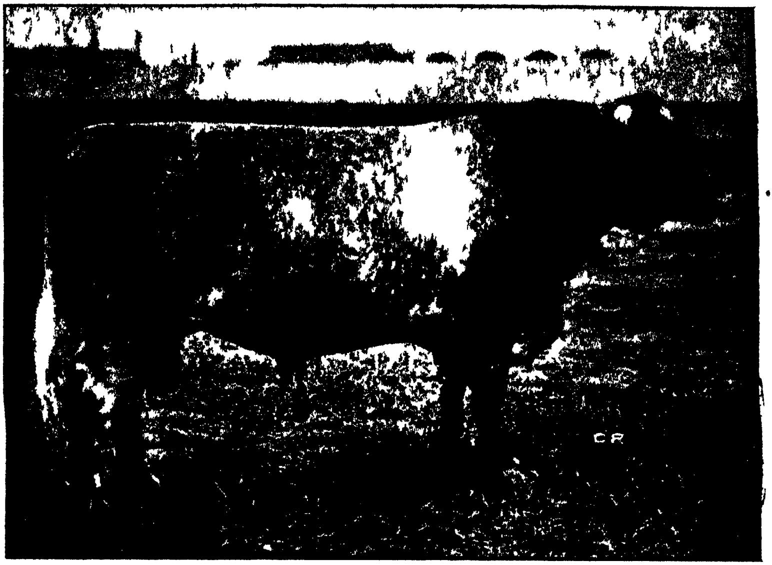

Fig 29 —SHORTHORN BULL, 'INSCHFIELD CLIPPER KING

Winner of Presidents Medal for best Shorthorn in Aberdeen Show 1920 The property of Mr Albert James Marshall Bridgebank Stranraer Bred by Mr G A Bruce, Inschfield, Insch Age two years and two months

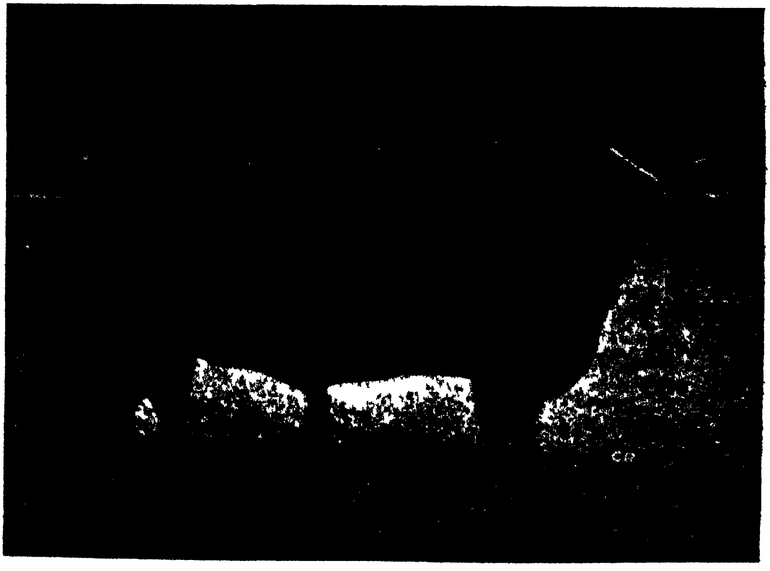

Fig 30 —ABERDEEN ANGUS BULL, 'ETRURIAN OF BLEATON" 41,498

Winner of Presidents Medal for best Aberdeen Angus animal Aberdeen Show, 1920 The property of Captain C T Scott, Buckland Manor, Broadway Worcs Bred by Mr J M Marshall of Bleaton, Blairgowrie Age three years and seven months

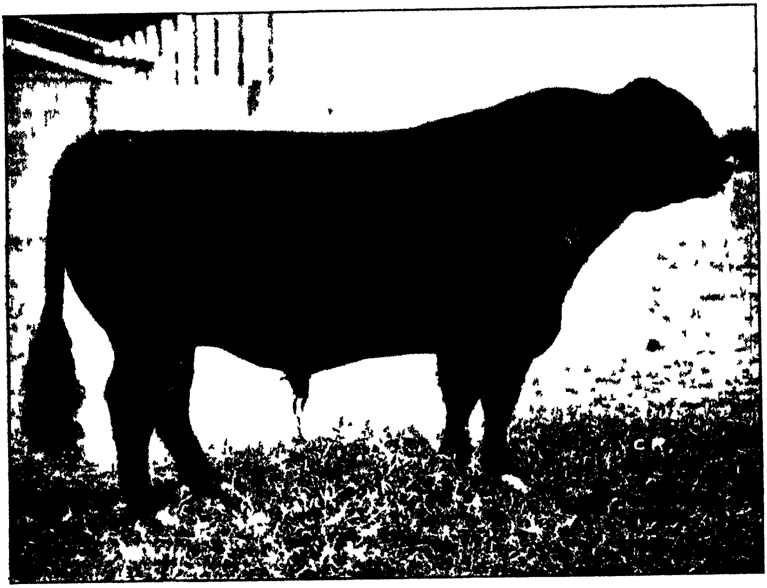

Fig. 31.—Galloway Bull, "Satthire" 12 268

Winner of President's Medal for best Galloway, Aberdeen Show, 1910. The property of Mr John Cunningham, Tarbreoch, Dalbeattie. Bred by Messrs Thomas Biggar & Sons, Chapelton, Dalbeattie. Age six years and two months.

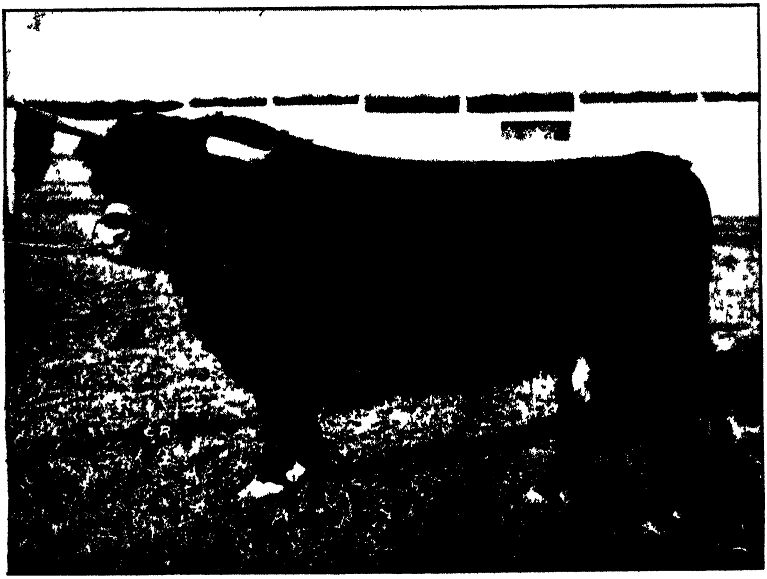

Fig. 32.—Highland Bull, "Carrick Sir Douglas"

Winner of President's Medal for best Highland animal, Aberdeen Show, 1910. Bred by and the property of Mr A. K. M'Douall, Logan, Stranraer. Age two years and five months.

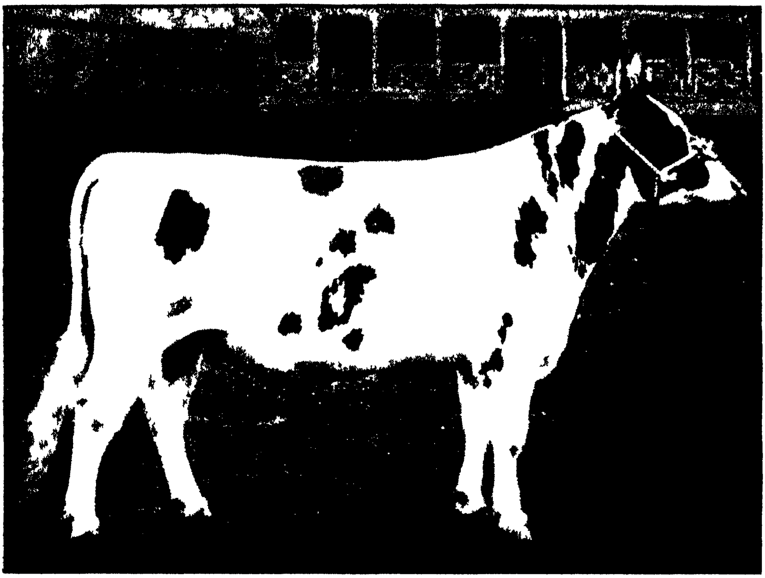

FIG. 33. AYRSHIRE BULL, HOWIE'S HOT STUFF 17895

Winner of President's Medal for best Ayrshire, Aberdeen Show, 1920. The property of Mrs Houison Craufurd, Dunlop House, Dunlop. Bred by Mr Thomas Logan, Low Milton, Maybole. Age two years and four months.

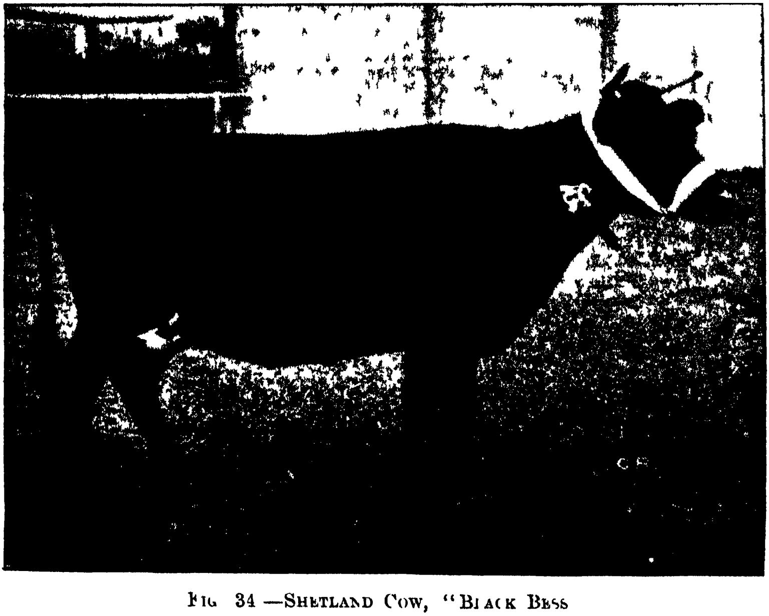

FIG. 34.—SHETLAND COW, "BLACK BESS

Winner of President's Medal for best Shetland animal, Aberdeen Show, 1920. The property of Mr William John Mackay, Castlepark, Lerwick. Bred by Mrs Cumming, Staneydale, Walls, Shetland. Age seven years.

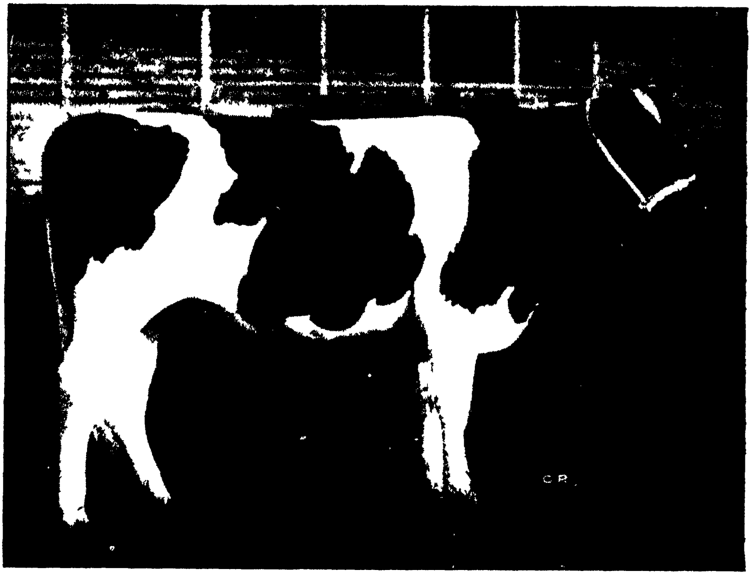

Fig 35.—British Friesian Heifer "Lochlands Pel Nasia

Winner of President's Medal for best British Friesian animal, Aberdeen Show, 1920. Bred by and the property of Mr Adam Smith, Lochlands, Larbert. Age one year and four months.

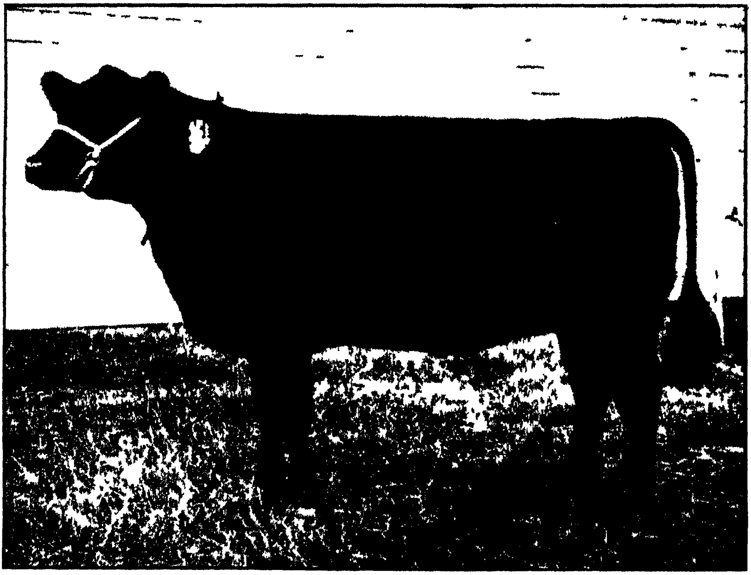

Fig 36.—Aberdeen Angus Shorthorn Heifer

Winner of President's Medal for best Fat animal, Aberdeen Show, 1920. Bred by and the property of Mr A. W. Howison, Lochbank, Blairgowrie. Age one year and four months.

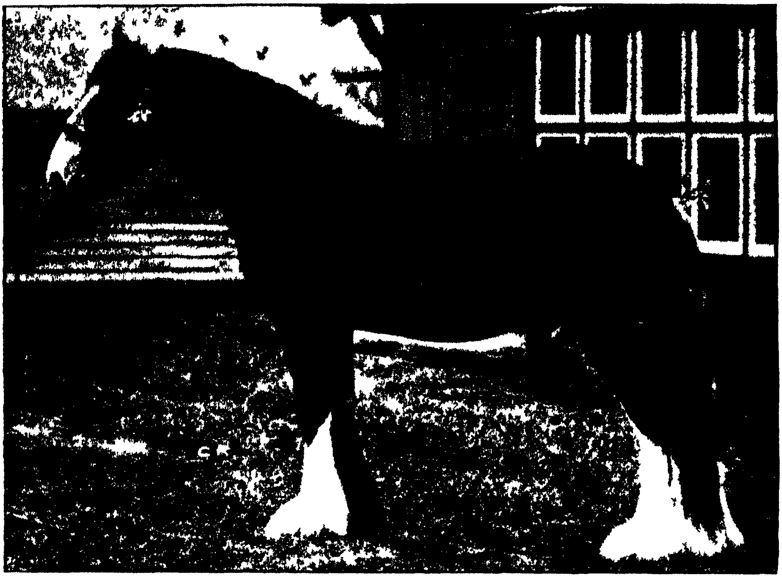

Fig 37 —Clydesdale Colt, 'Fyvie Sensation 20012

Winner of President's Medal for best Clydesdale Stallion or Colt Aberdeen Show 1920 The property of Mr Andrew M Montgomery of Nether Hall Castle Douglas Bred by Messrs J & P Donald Tillon Fyvie Age two years and two months

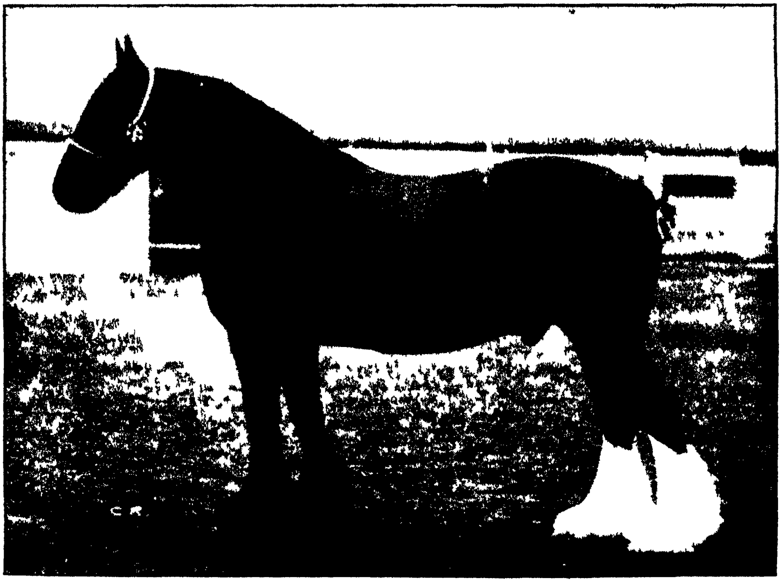

Fig 38 — Draught Gelding, "Bob

Winner of President's Medal for best Draught Gelding Aberdeen Show 1920 The property of the Scottish Co operative Wholesale Society Limited Glasgow Bred by Mr Forsyth Smailholm Kelso Age four years

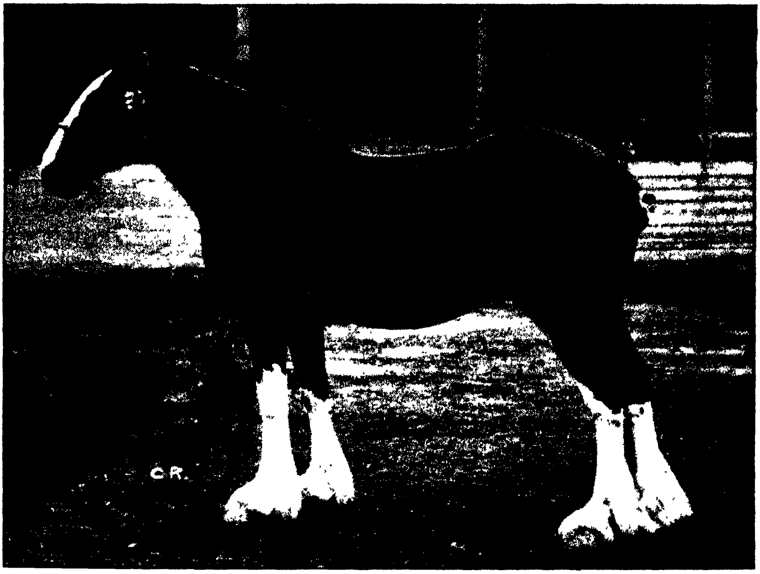

Fig. 39.—CLYDESDALE MARE, "VEDA" 48,672.

Winner of President's Medal for best Clydesdale Mare or Filly, Aberdeen Show, 1920. The property of Mr F. L. Wallace of Balcairn, Old Meldrum. Bred by Mr Robert Bryan, Orchardton, Cumnock. Age four years and two months.

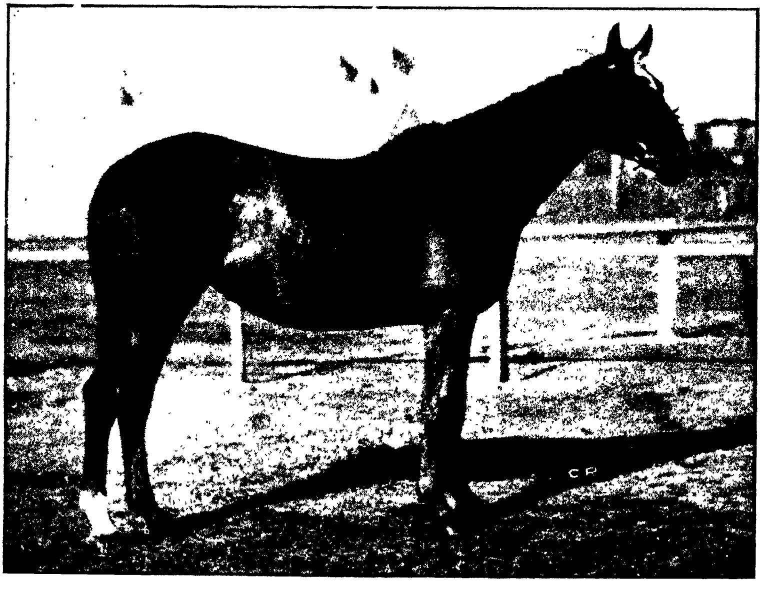

Fig. 40.—HUNTER FILLY, "FLANNELETTE" 5681.

Winner of President's Medal for best Hunter, Aberdeen Show, 1920. Bred by and the property of Mr Moffat S. Thomson, Spotsmains, Kelso. Age two years and three months.

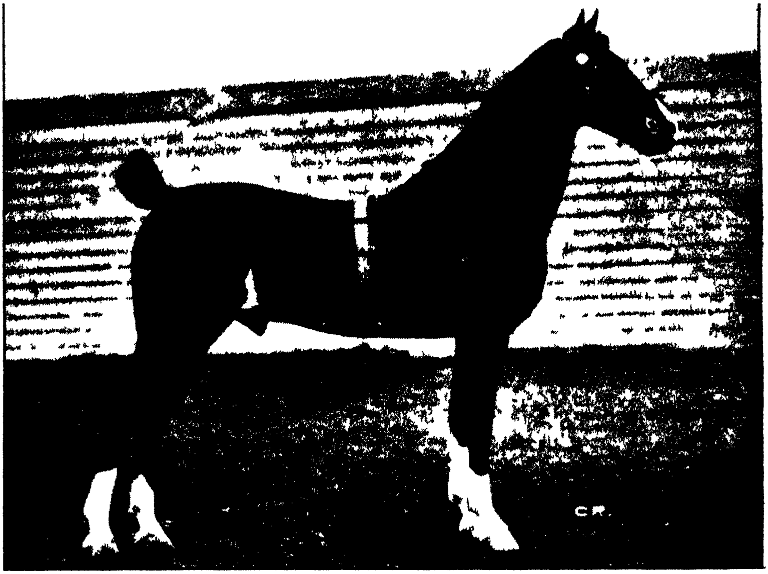

Fig 41 — Hackney Stallion Adbolton Kingmaker 12 271

Winner of President's Medal for best Hackney Aberdeen Show 1920 The property of Mr Walter Briggs Linden Hall Borwick Carnforth Lancashire Bred by Mr A W Hickling Wing Old Hall Oakham Age seven years

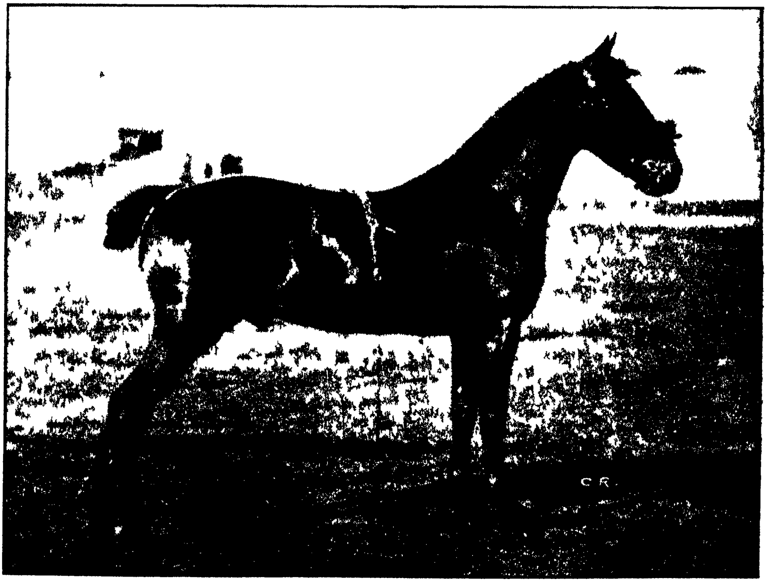

Fig 42 —Pony Stallion "Masquerader

Winner of President's Medal for best Pony Aberdeen Show 1920 Bred by and the property of Mr J E Kerr of Harviestoun, Dollar Age four years

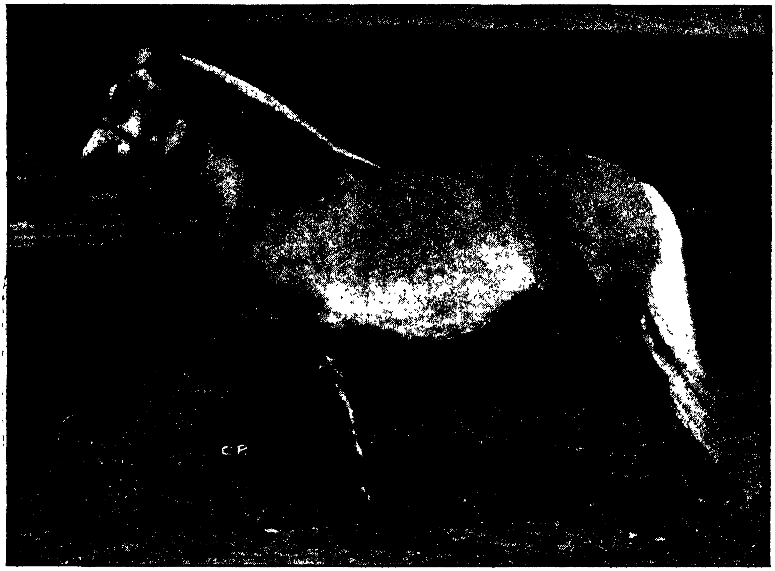

Fig. 43.—Highland Pony Mare, "Starlight."

Winner of President's Medal for best Highland Pony, Aberdeen Show, 1920. The property of Miss Kathleen Mackenzie of Farr, Farr, Daviot, Inverness-shire. Bred by Mr W. D. Mackenzie of Farr, Farr, Daviot, Inverness-shire. Age six years.

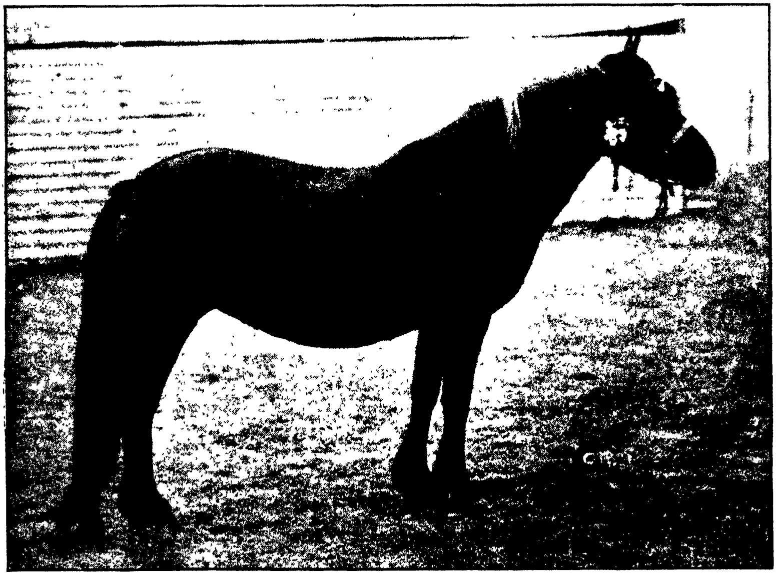

Fig. 44.—Western Island Pony Mare, "M

Winner of President's Medal for best Western Island Pony, Aberdeen Show, 1920. The property of Miss H. M. Duguid, Manar, Inverurie. Bred by Miss Norah Mackenzie, Calgary, Isle of Mull. Age twelve years.

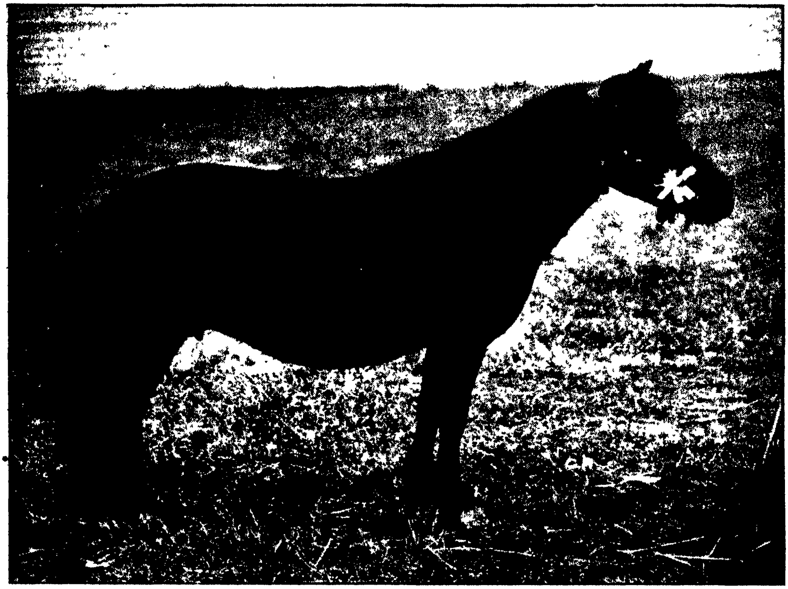

Fig. 15.—SHETLAND PONY MARE, "BRIGHT BLOSSOM" 3109.

Winner of President's Medal for best Shetland Pony, Aberdeen Show, 1920. Bred by and the pr perty of Mr P. F. Manson, Maryfield, Bressay, Lerwick. Age ten years and two months.

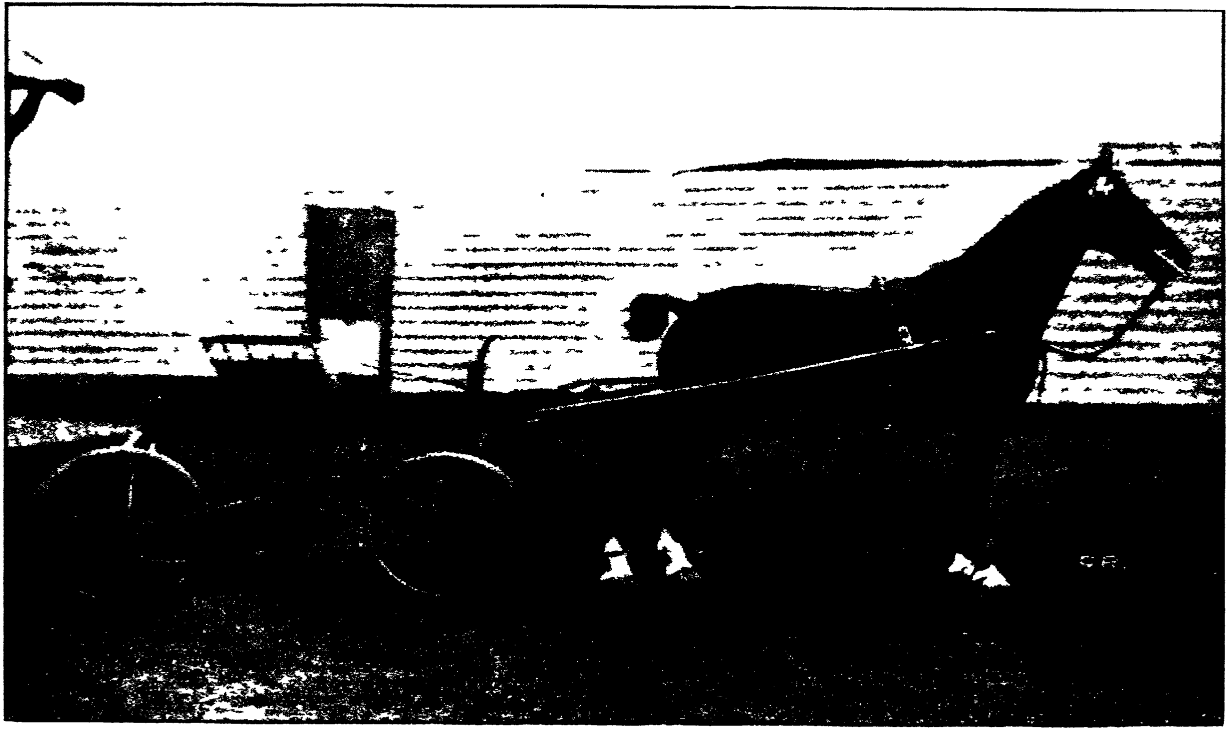

FIG. 46.—GELDING IN HARNESS, V.C.

Winner of President's Medal for best animal in Classes for Horses in Harness, Aberdeen Show 1920. The property of Mr William S. Millar of Balmanno Castle, Bridge of Earn. Bred by Mr Robert Scott, Thornhome, Carluke. Age five years.

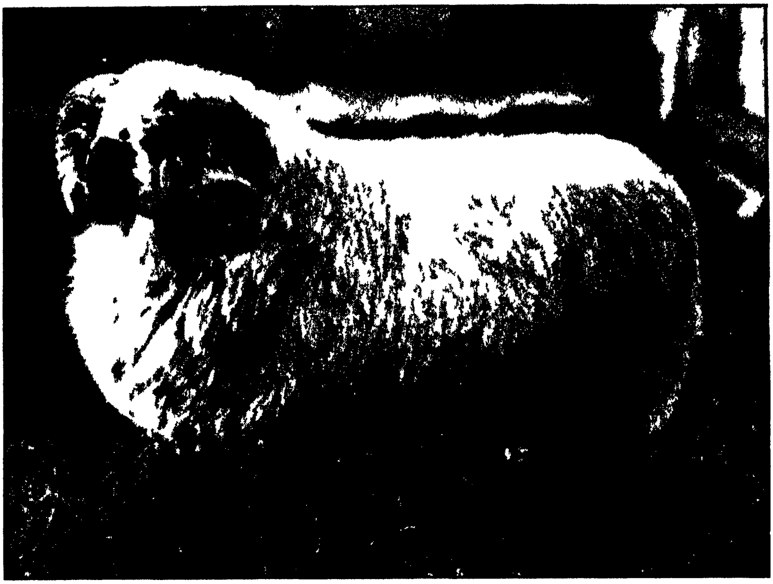

Fig. 47.—Blackface Tup, "Snowdrift."

Winner of President's Medal for best Blackface, Aberdeen Show, 1920. Bred by and the property of Mr Charles Cowan, [illegible] [illegible], [illegible]

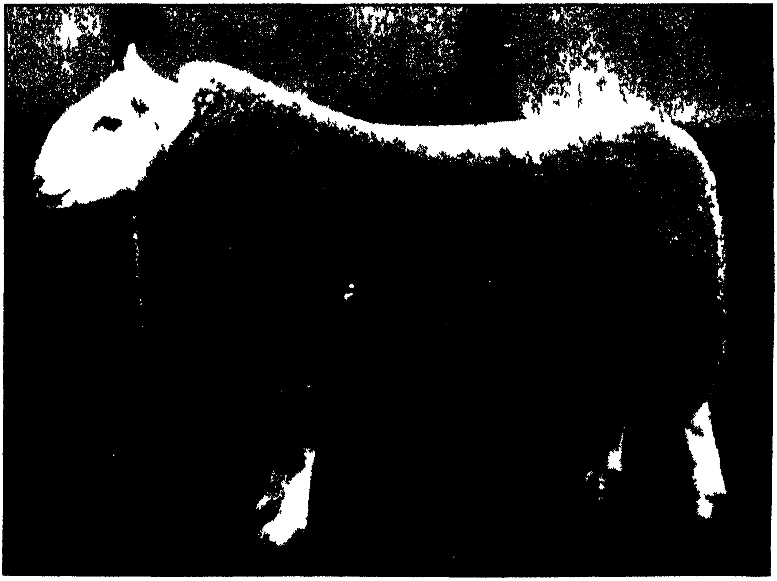

Fig. 48.—Cheviot Shearling Tup.

Winner of President's Medal for best Cheviot, Aberdeen Show, 1920. Bred by and the property of Mr John Elliot, Blackhaugh, Clovenfords.

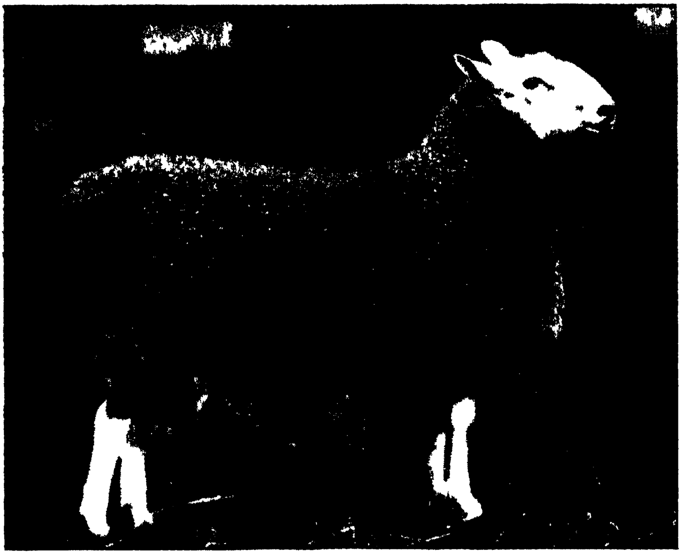

Fig. 49.—Border Leicester Tup "Dauntless," £600.

Winner of President's Medal for best Border Leicester, Aberdeen Show, 1920. The property of Mr William R. Ross, Milton of Culloden, Inverness. Bred by Mr. J. K[illegible] N[illegible], Prestonkirk. Age two shear.

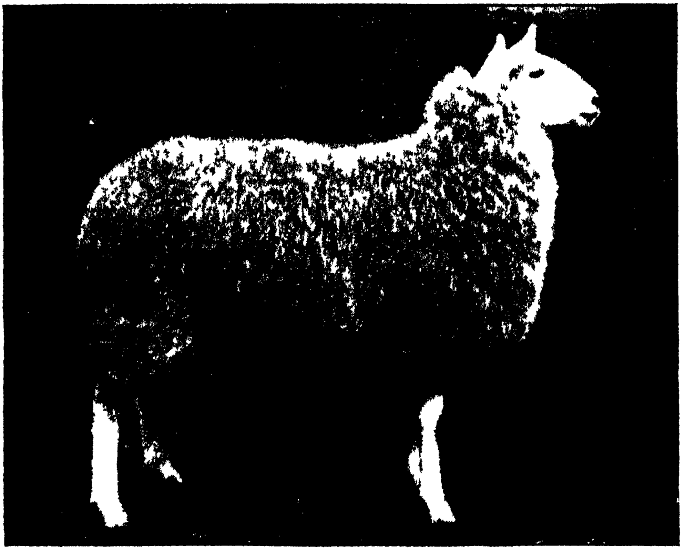

Fig. 50.—Half-bred Ewe Lamb.

Winner of President's Medal for best Half-bred, Aberdeen Show, 1920. Bred by and the property of Mr Thomas Armstrong, East Cote, Hawick.

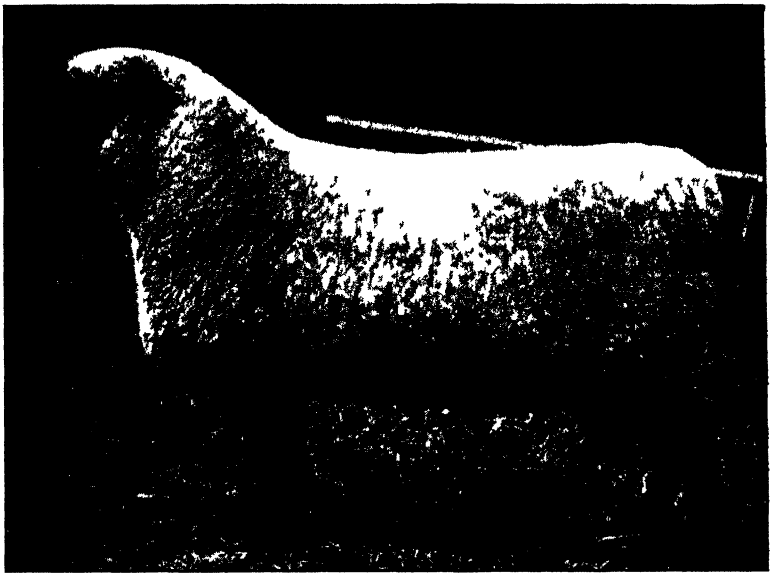

Fig 51 —Oxford Down Shearling Tup

Winner of President's Medal for best Oxford Down, Aberdeen Show, 1920 Bred by and the property of Messrs Thomas & Matthew Templeton Sandyknowe Kelso

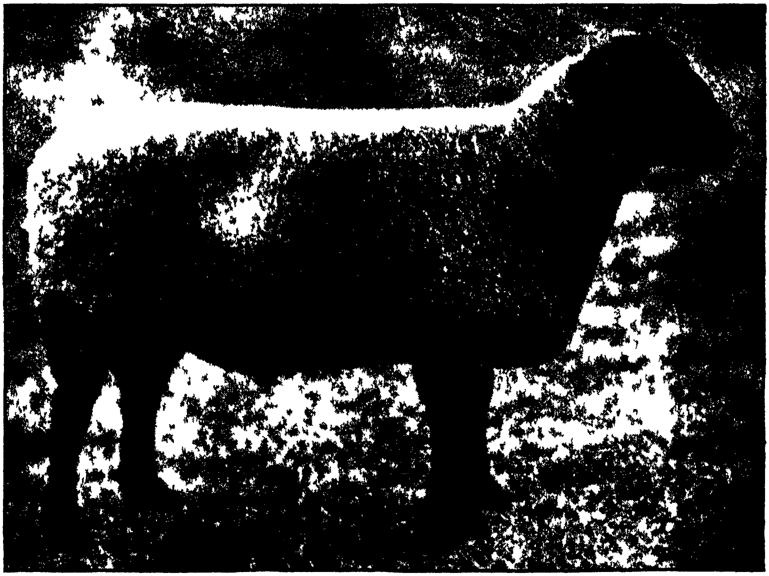

Fig 52 —Suffolk Tup Lamb

Winner of President's Medal for best Suffolk Aberdeen Show, 1920 Bred by and the property of Mr W W Hope, The Knowes, Prestonkirk

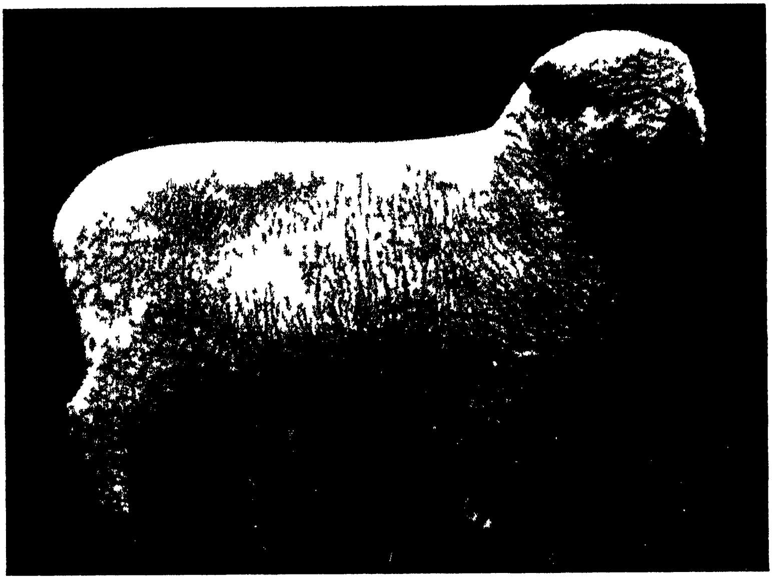

Fig 53 — Shropshire Shearling Tup

Winner of President's Medal for best Shropshire, Aberdeen Show 1920. Bred by and property of Mr Thomas A Buttar, Corston, Coupar Angus

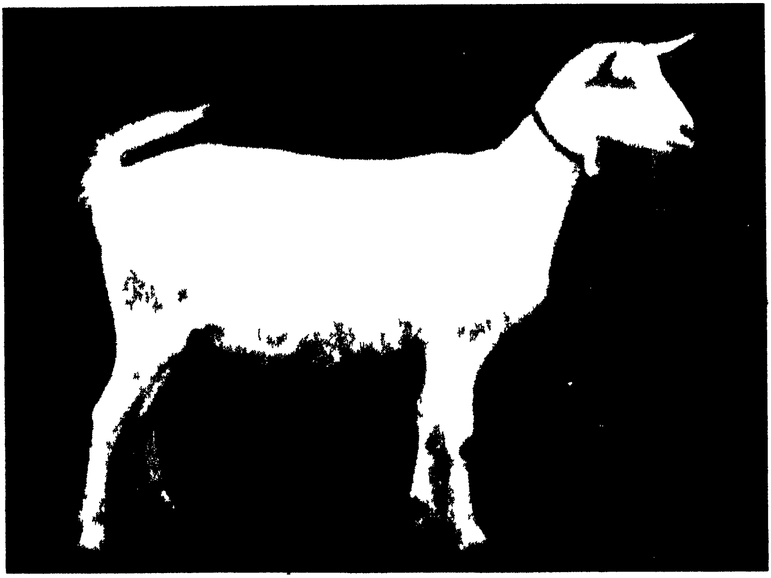

Fig 54 —Anglo Toggenburg Goatling, "Strathleven Maduinn" K R 6933

Winner of President's Medal for best Goat, Aberdeen Show, 1920. Bred by and the property of Miss Crum Ewing, Strathleven, Dumbarton. Age one year and two months

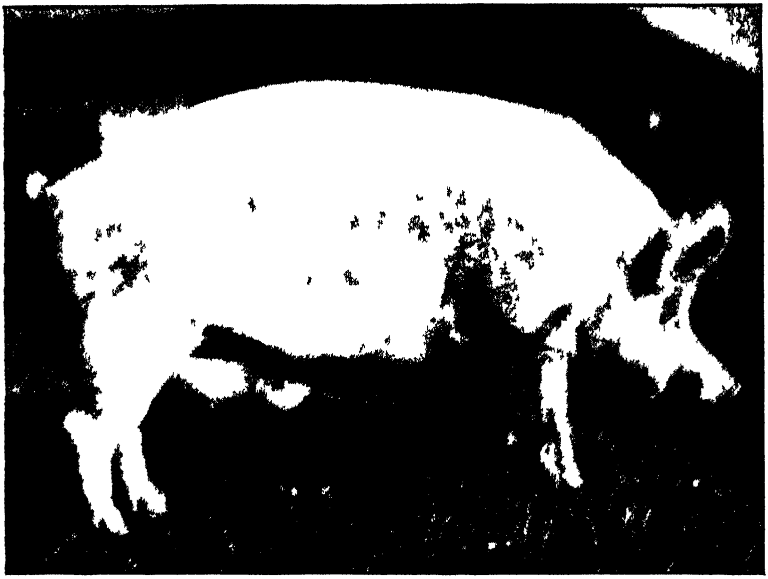

Fig 55 LARGE WHITE BOAR, "CRAIGCROOK KING 19TH" 21,021

Winner of President's Medal for best Large White Pig Aberdeen Show 1920 Bred by and the property of Mr D W Gunn Craigcrook Farm Blackhall Edinburgh Age four years and six months

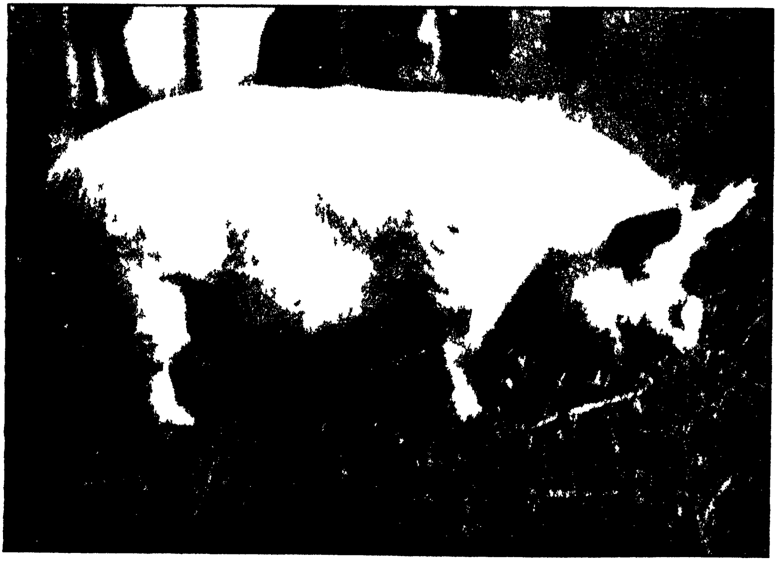

Fig 56 —MIDDLE WHITE SOW, "ROSEBUD OF MID LOTHIAN" 4 ,812

Winner of President's Medal for best Middle White Pig Aberdeen Show 1920 The property of the Earl of Rosebery K G , K T , Dalmeny House Edinburgh Bred by Messrs Chivers & Sons, Histon Cambridge Age six years and four months

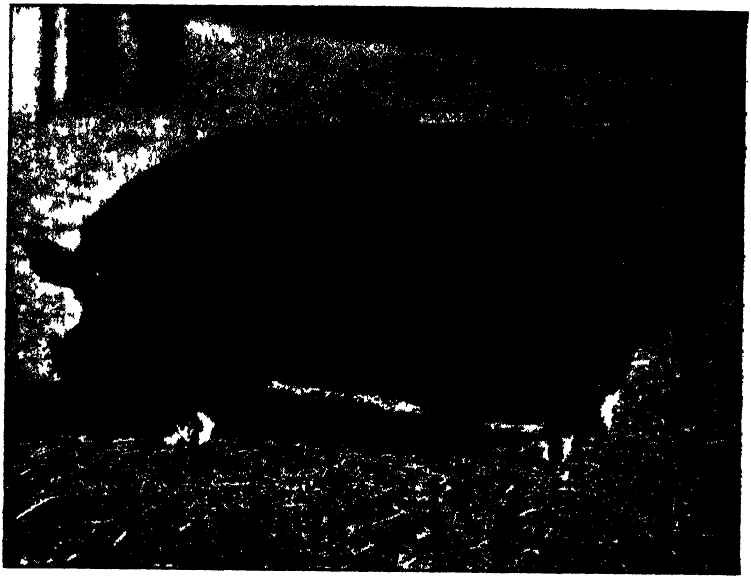

Fig 57 —BERKSHIRE BOAR, 'MURRELL PRINCE' 20,332

Winner of President's Medal for best Berkshire Pig, Aberdeen Show 1920 Bred by and the property of Mr W Howard Palmer Stoke Farm Wokingham Berkshire Age three years

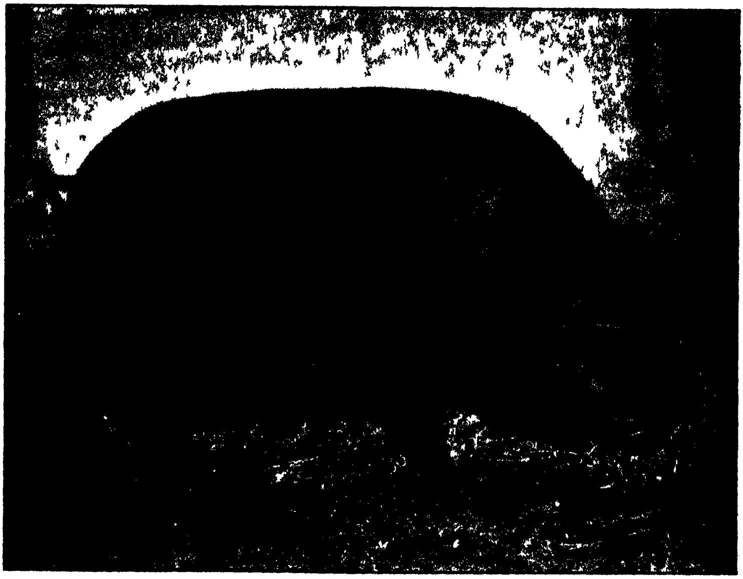

Fig 58 —LARGE BLACK SOW, "PARK SUNBEAM" 23,880

Winner of President's Medal for best Large Black Pig, Aberdeen Show, 1920 Bred by and the property of Mr James Adam, Park, Nairn Age one year and ten months

PREMIUMS AWARDED BY THE SOCIETY IN 1920.

ABERDEEN SHOW

20th, 21st, 22nd, and 23rd July 1920.

ABBREVIATIONS.—V., *Very Highly Commended.* *H.*, *Highly Commended.* C., *Commended.*

CATTLE.

SHORTHORN.

PRESIDENT'S CHAMPION MEDAL for Best Shorthorn.

No. 13 Albert James Marshall, Bridgebank, Stranraer, "Inschfield Clipper King."

Paisley Perpetual Gold Challenge Cup, value £300, *for best animal of the Shorthorn breed, "Extra Stock" being eligible to compete.* This Cup, along with an endowment of £600, was provided from money collected in Paisley by the late Provost Muir MacKean, and is in commemoration of the Society's first Show at Paisley in 1913.

No. 13 Albert James Marshall, Bridgebank, Stranraer, "Inschfield Clipper King."

Best Shorthorn Bull in the Show, entered or eligible for entry in Coates's Herd-Book—£20, given by the Shorthorn Society.

No. 13 Albert James Marshall, Bridgebank, Stranraer, "Inschfield Clipper King."

Silver Medal *to the Breeder of the winner of above Prize*—given by the Shorthorn Society.

No. 13 G. A. Bruce, Inschfield, Insch.

Breeder of best Bull of any age in Classes 1, 2, *and* 3—The Silver Medal.

No. 13 G. A. Bruce, Inschfield, Insch.

CLASS 1. BULL, calved before 1918.—Premiums, £15, £10, £5, and £3.

1st No. 6 Albert James Marshall, Bridgebank, Stranraer, "Pellipar Iris" (144,396).
2nd No. 1 A. V. Cameron, Newton of Stracathro, Brechin, "Beaufort Snow King" (140,873).
3rd No. 2 James A. Gardiner, Dargill, Crieff, "Aldie Emblem" (140,384).
4th No. 8 J. Duthie Webster, Tarves, Aberdeen, "Marquis of Millhills" (137,868).
V No. 3 Robert Graham, Auchengassel, Twynholm, "Marwood Florentine."

CLASS 2. BULL, calved in 1918.—Premiums, £15, £10, £5, and £3.

1st No. 13 Albert James Marshall, Bridgebank, Stranraer, "Inschfield Clipper King."
2nd No. 10 James Douglas Fletcher of Rosehaugh, Avoch, Ross-shire, "Bilsington Illustrious."

CLASS 3. BULL, calved in 1919.—Premiums, £12, £8, £4, and £2.

1st No. 20 Albert James Marshall, Bridgebank, Stranraer, "Rothes King 4th."
2nd No. 21 Albert James Marshall, Bridgebank, Stranraer, "Gainsford Nonsuch."
3rd No. 19 Albert James Marshall, Bridgebank, Stranraer, "Nonpariel Duke."
4th No. 17 A. M. Law, Carsewell, Alves, Elginshire, "Sanquhar Solid Silver."
V No. 15 James Durno, Rothiebrisbane, Fyvie, "Commander Premier."

The Emilio R. Casares, jun., "Junior Champion Challenge Cup," value £50, *for Shorthorn Bull Calf not exceeding fifteen months old that has passed the tuberculin test*, given by Mr Emilio R. Casares, jun., London.

No. 27 Alexander & Addie, Newbiggin, Cambus, "Aghalee Golden Baron."

CLASS 3A. BULL, calved on or after 20th April 1919.—Premiums, £12, £8, £4, and £2, given by Mr William Duthie, Collynie, Tarves.

1st No. 27 Alexander & Addie, Newbiggin, Cambus, "Aghalee Golden Baron."
2nd No. 30 William M'Allister, Drakies, Inverness, "Golden Star."
3rd No. 31 R. S. M'William, Stoneytown, Mulben, S.O., "Stoneytown Earl Butterfly."
4th No. 35 John James Moubray of Naemoor, Rumbling Bridge, "Naemoor Candidate."
V No. 34 The Earl of Moray, Doune Lodge, Doune, "Doune Graduate."

Best Shorthorn Female in the Show, entered or eligible for entry in Coates's Herd-Book—£20, given by the Shorthorn Society.

No. 41 William M'Allister, Draikie, Inverness, "Queen Pearl."

Silver Medal *to the Breeder of the winner of above Prize*—given by the Shorthorn Society.

No. 41 J. W. Gordon Oswald of Aigas, Beauly.

CLASS 4. COW, calved before 1918, in Milk.—Premiums, £12, £8, £4, and £2.

1st No. 41 William M'Allister, Draikies, Inverness, "Queen Pearl."
2nd No. 40 A. G. Maxtone Graham, Redgorton, Perth, "Dorothy XIII."
3rd No. 42 J. Duthie Webster, Tarves, Aberdeen, "Jilt Fern."
4th No. 39 James Douglas Fletcher of Rosehaugh, Avoch, Ross-shire, "Rosehaugh Lady Barrington."

CLASS 5. HEIFER or COW, calved in 1918.—Premiums, £10, £5, £3, and £2.

1st No. 45 R. Wylie Hill, Balthayock, Perth, heifer, "Inverness Nonpareil Princess."
2nd No. 43 James Douglas Fletcher of Rosehaugh, Avoch, Ross-shire, cow, "Rosehaugh Flora II."
3rd No. 46 The Earl of Moray, Doune Lodge, Doune, heifer, "Secret Sylvia."
4th No 44 A. G. Maxtone Graham, Redgorton, Perth, heifer, "Crocus Dewdrop."

CLASS 6. HEIFER, calved in 1919.—Premiums, £10, £5, £3, and £2.

1st No. 51 Captain A. M. Talbot Fletcher of Saltoun, Saltoun Hall, Pencaitland, East Lothian, "Bellona Girl."
2nd No. 55 The Earl of Moray, Doune Lodge, Doune, "Doune Rosewood IV."
3rd No. 56 John J. Moubray of Naemoor, Rumbling Bridge, "Naemoor Lavender."
4th No. 63 Peter Wilson, Lawhill, Auchterarder, "Millhills Buttercup II."
V No. 61 Mrs Smith, Pittodrie Home Farm, Pitcaple, "Eliza."
H No. 48 Robert Anderson, Fingask House, Oldmeldrum, "Golden Locks."
C No. 49 A. Cameron & Sons, Westside Farm, Brechin, "Guinevere XI."
C No. 50 Captain A. M. Talbot Fletcher of Saltoun, Saltoun Hall, Pencaitland, East Lothian, "Maid of Saltoun II."

ABERDEEN-ANGUS.

PRESIDENT'S CHAMPION MEDAL for best Aberdeen-Angus Animal.

No. 70 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Bleaton" (41,498).

Renfrewshire Perpetual Gold Challenge Cup, value £250, *for best animal of the Aberdeen-Angus breed, "Extra Stock" being eligible to compete.* This cup, along with an endowment of £500, was provided from money collected in Renfrewshire by the late Provost Muir MacKean of Paisley, and is in commemoration of the Society's first Show in the county of Renfrew in 1913.

No. 70 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Bleaton" (41,498).

Best Bull of any age in Classes 7, 8, *and* 9—Ballindalloch Challenge Cup, value £50, given by the late Sir George Macpherson-Grant, Bart.

No. 70 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Bleaton" (41,498).

Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.

No. 70 James M'L. Marshall of Bleaton, Blairgowrie.

Breeder of best Bull of any age in Classes 7, 8, *and* 9—The Silver Medal.

No. 70 James M'L. Marshall of Bleaton, Blairgowrie.

Champion Gold Medal, *for best Animal in the Breeding Classes, Breeding Animals shown as "Extra Stock" being eligible to compete,* given by the Aberdeen-Angus Cattle Society.

No. 70 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Bleaton" (41,498).

Silver Medal *for the best animal of the opposite sex to the winner of the Gold Medal,* given by the Aberdeen-Angus Cattle Society.

No. 109 James Kennedy of Doonholm, Ayr, "Mendoza" (58,601).

CLASS 7. BULL, calved before 1st December 1917.—Premiums, £15, £10, £5, and £3.

1st No. 70 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Etrurian of Bleaton" (41,498).
2nd No. 67 John M'G. Petrie, Mains of Aslud, New Deer, "Earl Taurus of Ballindalloch" (39,254).
3rd No. 72 Alexander Whyte, Easter Denoon, Glamis, "Denoon Bold Boy" (41,112).
4th No. 64 James Beddie, Banks, Strichen, "Evas of Ballindalloch" (41,525).
V No. 69 Brigadier-General Lord Saltoun, C.M.G., Philorth, Fraserburgh, "Black Jackto of Ballindalloch" (40,874).
H No. 65 John A. Grant, Wester Rarichie, Nigg Station, Ross-shire, "Facinello of Castlecraig" (41,751).

CLASS 8. BULL, calved on or after 1st December 1917.—Premiums, £15, £10, £5, and £3.

1st No. 80 Peter D. Robertson, Castlecraig, Nigg, Ross-shire, "Proud Eric of Aberlour" (44,516).
2nd No. 73 Viscount Allendale, Bywell Hall, Stocksfield-on-Tyne, "Proud Prince of Bywell" (44,528).
3rd No. 81 Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Gaffer VI. of Skillymarno" (43,737).
4th No. 77 A. W. Howison, Lochbank, Blairgowrie, "Beholder of Ballindalloch" (42,835).
V No. 79 John Philip, Dandaleith, Craigellachie, "Peacemaker of Curragh" (44,295).
H No. 82 Robert W. Walker, Portlethen, Aberdeen, "Jitomir" (43,907).

CLASS 9. BULL, calved on and after 1st December 1918.—Premiums, £12, £8, £4, and £2.

1st No. 93 Peter D. Robertson, Castlecraig, Nigg, Ross-shire, "Everest of Bleaton" (45,862).
2nd No. 87 John F. Cumming, Kinermony Farm, Aberlour, "Landsman of Inchgower" (44,967).
3rd No. 98 James Whyte, Hayston, Glamis, Forfar, "Village Editor" (47,079).
4th No. 84 George F. Barron, Thomastown, Auchterless, "Black Bion of Castlecraig" (45,065).
V No. 96 George R. Sharp, Mains of Panholes, Blackford, Perthshire, "Hayston Erica Brand" (46,045).
H No. 97 Sir John Stewart-Clark of Dundas, Bart, Dundas Castle, South Queensferry, "Ethic of Bleaton" (45,794).
C No. 88 Garden A. Duff of Hatton Castle, Turriff, "Idolon" (46,087).
C No. 94 C. T. Scott, Buckland Manor, Broadway, Worcestershire, "Proud George of Buckland" (46,790).

Best Cow of any age in Class 10—Ballindalloch Challenge Cup, value £50, given by the late Sir John Macpherson-Grant, Bart. of Ballindalloch.

No. 109 James Kennedy of Doonholm, Ayr, "Mendoza" (58,601).

Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.

No. 109 James Kennedy of Doonholm, Ayr.

CLASS 10. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1st No. 109 James Kennedy of Doonholm, Ayr, "Mendoza" (58,601).
2nd No. 105 John F. Cumming, Kinermony Farm, Aberlour, "Juaniva Erica" (51,000).
3rd No. 100 His Majesty the King, Abergeldie Mains, Ballater, "Elerie" (55,562).
4th No. 111 Gordon Reid Shiach of Rosebrae, Elgin, "Blackberry II. of Ballintomb" (55,633).
V No. 107 Sir John R. Findlay, K.B.E., of Aberlour, Aberlour, "Pride of Spey XIV." (54,230).
H No. 110 Charles Penny, Skillymarno, Strichen, "Infantine of Skillymarno" (60,888).
C No. 104 George Cran, Morlich, Glenkindie, Aberdeen, "Evolution III. of Ballindalloch" (52,516).

CLASS 11. HEIFER, calved on or after 1st December 1917.—Premiums, £10, £5, £3, and £2.

1st No. 119 James Kennedy of Doonholm, Ayr, "Marsala" (62,717).
2nd No. 123 Charles Penny, Skillymarno, Strichen, "Pride X. of Stenhouse" (62,867).
3rd No. 124 Andrew Thomson Reid of Auchterarder House, Auchterarder, "Proud Genesta" (63,263).
4th No. 125 Gordon Reid Shiach of Rosebrae, Elgin, "Blackberry of Rosebrae" (63,412).

V No. 113 Viscount Allendale, Bywell Hall, Stocksfield-on-Tyne, "Grace of Bywell" (61,605).
H No. 116 Sir John R. Findlay, K.B.E., of Aberlour, Aberlour, "Eventide II. of Castlecraig" (63,338).
C No. 112 His Majesty the King, Abergeldie Mains, Ballater, "Gwypolie" (61,517).
C No. 122 Charles Penny, Skillymarno, Strichen, "Ebbright V. of Skillymarno" (63,158).

CLASS 12. HEIFER, calved on or after 1st December 1918.—
Premiums, £10, £5, £3, and £2.

1st No. 142 Andrew Thomson Reid of Auchterarder House, Auchterarder, "Proud Grisette" (65,624).
2nd No. 141 John N. Rae, Mounthooly, Rosehearty, "Jovil Jilt" (65,600).
3rd No. 138 Charles Penny, Skillymarno, Strichen, "Belgian Maid VII. of Skillymarno" (65,498).
4th No. 134 James Kennedy of Doonholm, Ayr, "Black Begonia" (65,038).
V No. 132 Sir John R. Findlay, K.B.E., of Aberlour, Aberlour, "Pandia."
H No. 131 John F. Cumming, Kinermony Farm, Aberlour, "Evie of Kinermony" (64,359).
C No. 143 Earl of Rosebery and Midlothian, K.G., K.T., Dalmeny House, Edinburgh, "Black Bartonia of Dalmeny" (65,715).
C No. 147 Sir John Stewart-Clerk of Dundas, Bart., Dundas Castle, South Queensferry, West Lothian, "Grace 2nd of the Dell" (64,839).

GALLOWAY.

PRESIDENT'S CHAMPION MEDAL for best Galloway.

No. 151 John Cunningham, Tarbreoch, Dalbeattie, "Sapphire" (12,268).

Breeder of best Bull of any age in Classes 13, 14, *and* 15—The Silver Medal.

No. 151 Thomas Biggar & Sons, Chapelton, Dalbeattie.

Dr Gillespie Memorial Challenge Trophy, value £50, *for best Galloway Animal registered in the Galloway Herd-Book, entered in any of the Breeding Classes, Breeding Animals shown as "Extra Stock" being eligible to compete*—given by the Galloway Cattle Society of Great Britain and Ireland.

No. 151 John Cunningham, Tarbreoch, Dalbeattie, "Sapphire" (12,268)

CLASS 13. BULL, calved before 1st December 1917.—
Premiums, £15, £10, £5, and £3.

1st No. 151 John Cunningham, Tarbreoch, Dalbeattie, "Sapphire" (12,268).
2nd No. 152 W. B. Donaldson, Auchineden, Blanefield, Galloway, "Tarbreoch Cæsar" (13,065).
3rd No. 153 Robert Graham, Auchengassel, Twynholm, "Tarbreoch Worthy" (13,426).

CLASS 14. BULL, calved on or after 1st December 1917.—
Premiums, £15, £10, £5, and £3.

1st No. 160 Herbert Haggas, Barnsoul Farm, Dumfries, "Choice Goods of Stepford" (13,734).
2nd No. 157 Sir Robert William Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Darnley IV. of Castlemilk" (13,866).
3rd No. 159 Robert Graham, Auchengassel, Twynholm, "Uphold of Auchengassel" (13,839).
4th No. 161 Arthur Young, Garroch, Dalry, Galloway, "Sir Denzil of Craigneston" (13,831).

CLASS 15. BULL, calved on or after 1st December 1918.—Premiums, £12, £8, £4, and £2.

1st	No. 164	Robert Wilson, 30 Cambridge Street, Newcastle-on-Tyne, "Sir Digby II. of Craigueston" (14,155).
2nd	No. 163	Robert Graham, Chapel of Logan, Canonbie, "Quibbler" (14,051).
3rd	No. 162	Robert Graham, Auchengassel, Twynholm, "Valet of Auchengassel" (14,158).

CLASS 16. COW, of any age, in Milk.—Premiums, £12, £8, £4, and £2.

1st	No. 167	Sir Robert William Buchanan Jardine of Castlemilk, Bart., Lockerbie, "Dorothy of Castlemilk" (24,676).
2nd	No. 165	Sir Robert William Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Fanny X. of Barlae" (23,054).
3rd	No. 170	Robert Graham, Auchengassel, Twynholm, "Jenny of Auchengassel" (25,879).
4th	No. 169	Robert Graham, Auchengassel, Twynholm, "Nora of Auchengassel" (22,596).
V	No. 168	John Cunningham, Tarbreoch, Dalbeattie, "May Queen of Glasnick" (17,787).
H	No. 171	Robert Graham, Chapel of Logan, Canonbie, "Logan Lady III." (22,924).

CLASS 17. HEIFER, calved on or after 1st December 1917.—Premiums, £10, £5, £3, and £2.

1st	No. 173	John Cunningham, Tarbreoch, Dalbeattie, "Tarbreoch Doris XIII." (26,357).
2nd	No. 178	Robert Graham, Chapel of Logan, Canonbie, "Logan Lady V." (26,463).
3rd	No. 174	Francis N. M. Gourlay, Milnton, Tynron, Thornhill, Dumfriesshire, "Freda VII. of Craigneston" (26,444).
4th	No. 177	Robert Graham, Chapel of Logan, Canonbie, "Logan Lady VI." (26,460).
V	No. 176	Francis N. M. Gourlay, Milnton, Tynron, Thornhill, Dumfriesshire, "Christmas Rose of Craigneston" (26,446).
C	No. 172	Sir Robert William Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Esmee VI. of Stepford" (26,293).
C	No. 179	Arthur Young, Garroch, Dalry, Galloway, "Quaver of Waterside" (26,775).

CLASS 18. HEIFER, calved on or after 1st December 1918.—Premiums £10, £5, £3, and £2.

1st	No. 185	W. B. Donaldson, Auchineden, Blanefield, "Mona of Killearn" (26,898).
2nd	No. 184	W. B. Donaldson, Auchineden, Blanefield, "Olivia of Killearn" (26,897).
3rd	No. 181	John Cunningham, Tarbreoch, Dalbeattie, "Queen May XIV. of Tarbreoch" (26,878).
4th	No. 180	Sir Robert William Buchanan-Jardine of Castlemilk, Bart., Lockerbie, "Chloris of Castlemilk" (27,020).
V	No. 187	Herbert Haggas, Barnsoul Farm, Dumfries, "Alice of Stepford" (26,828).
H	No. 183	W. B. Donaldson, Auchineden, Blanefield, "Clare IV. of Killearn" (26,896).

HIGHLAND.

PRESIDENT'S CHAMPION MEDAL for best Highland Animal.

No. 193 A. K. M'Douall, Logan, Stranraer, "Carrick Sir Douglas."

Perpetual Victory Challenge Cup, approximate value 50 Guineas, *for the best Animal in the Male Classes, "Extra Stock" being eligible to compete*—given by the Highland Cattle Society of Scotland.

No. 193 A. K. M'Douall, Logan, Stranraer, "Carrick Sir Douglas.'

Breeder of best Bull of any age in Classes 19, 20, *and* 21—The Silver Medal.

No. 193 A. K. M'Douall, Logan, Stranraer.

CLASS 19. BULL, calved before 1918.—Premiums, £15, £10, £5, and £3.

1st	No. 190	The Earl of Southesk, Kinnaird Castle, Brechin, "Glencripesdale" (2758).
2nd	No. 189	Miss Grace Macalastair Hall, Tangy, Kilkennie, Kintyre, Campbeltown, "Ridhire of Garth" (3011).

CLASS 20. BULL, calved in 1918.—Premiums, £15, £10, £5, and £3.

1st	No. 193	A. K. M'Douall, Logan, Stranraer, "Carrick Sir Douglas."
2nd	No. 194	Trustees for Mrs Maze of Achnacloich, Connel, Argyll, "An Cheard Rhiabhach."
3rd	No. 191	James Carnegie, Stronvar, Balquhidder, Perthshire, "Auchmar."
4th	No. 192	Marquis of Graham, Brodick Castle, "Righ Calum of Atholl."

CLASS 21. BULL, calved in 1919.—Premiums, £12, £8, £4, and £2.

1st	No. 195	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Ossian Ban of Atholl."
2nd	No. 199	D. A. Stewart of Lochdhu, Lochdhu, Nairn, "Uachdaran."
3rd	No. 198	Trustees for Mrs Maze of Achnacloich, Connel, Argyll, "Culnadalloch General."
4th	No. 197	Trustees for Mrs Maze of Achnacloich, Connel, Argyll, "Major of Culnadalloch."

Perpetual Victory Challenge Cup, approximate value 35 Guineas, *for the best Animal in the Female Classes, "Extra Stock" being eligible to compete*—given by the Highland Cattle Society of Scotland.

No. 214 The Earl of Southesk, Kinnaird Castle, Brechin, "Princess Caroline II."

CLASS 22. COW, of any age, in milk.—Premiums, £12, £8, £4, and £2.

1st	No. 200	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Annag Ruadh II. of Castle Grant" (8247).
2nd	No. 201	James Carnegie, Stronvar, Balquhidder, "Lady White III."
3rd	No. 203	D. A. Stewart of Lochdhu, Lochdhu, Nairn, "Shellay Crunair."
4th	No. 202	William Dalziel Mackenzie of Farr, Farr, Daviot, Inverness, "Iseabal III. of Farr" (8995).

CLASS 23. HEIFER, calved in 1917.—Premiums, £10, £5, £3, and £2.

1st	No. 204	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Annag Ruadh I of Atholl."
2nd	No. 206	The Earl of Southesk, Kinnaird Castle, Brechin, "Sidonia IV."
3rd	No. 207	D. A. Stewart of Lochdhu, Lochdhu, Nairn, "Laochag Crunair."
4th	No. 205	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Mairi Ruadh XVI. of Atholl."
V	No. 208	D. A. Stewart of Lochdhu, Lochdhu, Nairn, "Laochag Ensay."

CLASS. 24. HEIFER, calved in 1918.—Premiums, £10, £5, £3, and £2.

1st	No. 214	The Earl of Southesk, Kinnaird Castle, Brechin, "Princess Caroline II."
2nd	No. 212	William Dalziel Mackenzie of Farr, Farr, Daviot, Inverness, "Dileas of Farr."
3rd	No. 213	The Earl of Southesk, Kinnaird Castle, Brechin, "Corrina IV."
4th	No. 209	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Bean Bhan IX. of Atholl."
V	No. 211	William Dalziel Mackenzie of Farr, Farr, Daviot, Inverness, "Mona of Farr."
H	No. 215	D. A. Stewart of Lochdhu, Lochdhu, Nairn, "Laochag Arion."
C	No. 210	The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Te Riabhach XIX. of Atholl."

AYRSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Ayrshire.

No. 253 Mrs Houison-Craufurd, Dunlop House, Dunlop, "Howie's Hot Stuff" (17,895).

Special Prize of £10 *for the best Female Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than* 1*st June* 1920—given by the Ayrshire Cattle Herd-Book Society.

No. 226 William Hodge, Slodahill, Lockerbie, "Slodahill Alice II." (A 6634).

Class 25. COW in Milk, calved before 1917.—Premiums £12, £8, and £4.

1st	No. 217	Mrs Houison-Craufurd, Dunlop House, Dunlop, "Bruchag Pearl II." (A 2070).
2nd	No. 222	Andrew Logan, Overton, Drongan, "Overton Dewdrop" (39,988).
3rd	No. 223	Hugh W. B. Crawford, Chapmanton, Castle-Douglas, "Chapmanton Swanny III." (32,955).

Class 26. COW in Milk, calved after 1st January 1917.—Premiums, £10, £7, and £3.

(*No Entry.*)

Class 27. COW of any age, in Calf, or HEIFER, calfed in 1917, in Calf, and due to calve within nine months after the Show.—Premiums, £10, £7, and £3.

1st	No. 226	William Hodge, Slodahill, Lockerbie, "Slodahill Alice II." (A 6634).
2nd	No. 224	Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Auchlochan Nora" (28,867).
3rd	No. 229	Adam W. Montgomery, Lessnessock, Ochiltree, "Redhills Beatrice" (48,767).
V	No. 230	Mungo Sloan, Douglas Hall, Ecclefechan, "Douglas Hall Dandy II."
H	No. 228	Robert Marshall, Mains of Kilmaronock, by Alexandria, "Auchenbainzie Mist" (48,038).
C	No. 227	Major Henry Keswick, Cowhill Tower, Dumfries, "Mainhill Ruby" (6473).

Class 28. HEIFER, calved in 1918.—Premiums, £10, £5, and £3.

1st	No. 237	Adam W. Montgomerie, Lessnessock, Ochiltree, "Garlaff Marjorie II."
2nd	No. 239	Robert Osborne, Morton Mains, Thornhill, "Milly."
3rd	No. 231	The Hon. G. Corbett, Rowallan, Kilmarnock, "Howie's Stately Maid II"
V	No. 240	Sir Hugh Shaw Stewart of Ardgowan and Blackhall, Bart., C.B., Inverkip, "Ardgowan Lottery" (63,455).
H	No. 234	Major Henry Keswick, Cowhill Tower, Dumfries, "Cowhill White Lily."
C	No. 238	Robert Osborne, Morton Mains, Thornhill, Dumfriesshire, "Moyra."

Class 29. HEIFER, calved in 1919.—Premiums, £8, £5, and £3.

1st	No. 246	John Logan, Bargenoch, Drongan, "Bargenoch Minerva" (57,404).
2nd	No. 248	Adam W. Montgomerie, Lessnessock, Ochiltree, "Whitehill Lady Rose."
3rd	No. 243	Mrs Houison-Craufurd, Dunlop House, Dunlop, "Dunlop Flummery" (64,157).
V	No. 249	Robert Osborne, Morton Mains, Thornhill, "Gladys."
H	No. 242	Mrs Honison-Craufurd, Dunlop House, Dunlop, "Dunlop Memory" (64,167).
C	No. 241	Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Auchlochan Della."

Special Prize of £10 *for the best Male Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than* 1st *June* 1920—given by the Ayrshire Cattle Herd-Book Society.

No. 253 Mrs Houison-Craufurd, Dunlop House, Dunlop, "Howie's Hot Stuff" (17,895).

Breeder of best Bull of any age in Classes 30, 31, *and* 32—The Silver Medal.

No. 253. Mr Thomas Logan, Low Milton, Maybole.

CLASS 30. BULL, calved before 1918.—Premiums, £12, £8, and £4.

1st No. 251 Robert Dickie, Knockengig, Sanquhar, "Hobsland Scotland's Best" (15,103).
2nd No. 252 Sir Hugh Shaw Stewart of Ardgowan and Blackhall, Bart., C.B., Inverkip "Bargenoch Nonpareil" (16,447).

CLASS 31. BULL, calved in 1918.—Premiums, £10, £7, and £3.

1st No. 253 Mrs Houison-Craufurd, Dunlop House, Dunlop, "Howie's Hot Stuff" (17,895).
2nd No. 255 Thomas Logan, Low Milton, Maybole, "Bargenoch Right at Last" (17,295).
3rd No. 256 Robert Marshall, Mains of Kilmaronock, by Alexandria, "Cawhillan Flashlight" (18,197).
V No. 254 John Logan, Bargenoch, Drongan, "Finlayston Illustrious" (17,132).

CLASS 32. BULL, calved in 1919.—Premiums, £8, £5, and £3.

1st No. 257 The Hon. G. Corbett, Rowallan, Kilmarnock, "Hobsland Mendel" (18,422).
2nd No. 260 Thomas Logan, Low Milton, Maybole, "Overton Johnnie Walker" (18,829).
3rd No. 259 Major Henry Keswick, Cowhill Tower, Dumfries, "Drumsuie Royal Guard" (18,631).
V No. 261 Robert Osborne, Morton Mains, Thornhill, "Golden Gem" (18,462).

MILK RECORD CLASS.

CLASS 33. BULL, any age, the progeny of an Ayrshire Cow having an authenticated milk yield.—Premiums, £15, £10, and £5—given by the Board of Agriculture for Scotland.

1st No. 253 Mrs Houison-Craufurd, Dunlop House, Dunlop, "Howie's Hot Stuff" (17,895).

SHETLAND.

PRESIDENT'S CHAMPION MEDAL for best Shetland Animal.

No. 264 William John Mackay, Castlepark, Lerwick, "Black Bess."

CLASS 34. COW, any age.—Premiums, £5, £3, and £2.

1st No. 264 William John Mackay, Castlepark, Lerwick, "Black Bess."
2nd No. 265 R. W. R. Mackenzie, Earlshall, Leuchars, "Olney of Earlshall."
3rd No. 262 Thomas James Anderson, Cairnfield, Lerwick, "Cairnfield Bella."
V No. 266 P. F. Manson, Maryfield, Bressay, Lerwick, "Spottie of Maryfield."
C No. 263 Mrs Bruce of Sumburgh, Lerwick, "Bride" (687).

CLASS 35. HEIFER, calved in 1919.—Premiums, £5, £3, and £2.

1st No. 268 R. W. R. Mackenzie, Earlshall, Leuchars, "Maggie of Earlshall."
2nd No. 269 John Smith, Setter, Sandwick, Shetland, "Martha of Setter."
3rd No. 267 R. W. R. Mackenzie, Earlshall, Leuchars, "Kit Cat of Earlshall."

EXTRA STOCK (BULL).

The following was Very Highly Commended, and a Silver Medal awarded:—

No. 270 William John Mackay, Castlepark, Lerwick, "Bayardo of Sumburgh.

BRITISH FRIESIAN.

PRESIDENT'S CHAMPION MEDAL for best British Friesian Animal.

No. 327 Adam Smith, Lochlands, Larbert, "Lochlands Pel Naspa."

Two Champion Silver Medals offered by the British Friesian Cattle Society *for the best Female and for the best Male exhibited.*

No. 272 George Findlay, Grasslaw, Stonehaven (Bull), "Golf Botermijn" (Imp.) (7123).

No. 327 Adam Smith, Lochlands, Larbert (Cow), "Lochlands Pel Naspa."

CLASS 36. BULL, calved in or before 1917.—Premiums, £10, £5, and £3.

1st	No. 272	George Findlay, Glasslaw, Stonehaven, "Golf Botermijn" (Imp.) (7123).
2nd	No. 274	Hamilton Brothers, Kessington, Bearsden, "Terling Donovan" (8805).
3rd	No. 275	Steven Sibbald, Cushenquarter, Plean, Stirling, "Dunninald Herringa Lad" (7719).
C	No. 273	James Findlay, Balquharn, Portlethen, Aberdeen, "Portlethen Prince" (6847).

CLASS 37. BULL, calved in 1918.—Premiums, £10, £5, and £3.

1st	No. 278	G. A. Francis, West Seaton, Arbroath, "Seaton Roland" (10,593).
2nd	No. 276	Andrew Brooks, North Elphinstone, Tranent, "Tantallon Robert" (10,661).
3rd	No. 277	George A. Ferguson, Surradale, Elgin, "Moray Midas" (30,060).
C	No. 279	Thomas Adam Simpson, Colleonard, Banff, "Macknade Jester" (1918).

CLASS 38. BULL, calved in 1919.—Premiums, £10, £5, and £3.

1st	No. 284	Andrew Spence, Commieston, Montrose, "Seaton Holland Johan" (Imp.)
2nd	No. 285	Captain John Stirling, Fairburn, Muir of Ord, "Seaton Emperor" (12,685).
3rd	No. 283	William Sinclair, Loirston, Nigg, Aberdeen, "Kirkhill Stuart."
C	No. 281	G. A. Francis, West Seaton, Arbroath, "Seaton Dell Hollander II."

CLASS 39. COW in Milk, calved in or before 1916.—Premiums, £10, £5, and £3.

1st	No. 287	Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Lochlands Chloe" (15,328).
2nd	No. 288	Andrew Spence, Commieston, Montrose, "Commieston Girl 2nd" (23,972).
3rd	No. 289	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Ella" (17,514).
C	No. 286	George H. M. Burnet, of Elrick, Newmachar, Aberdeen, "Findlay Dily" (7932).

CLASS 40. HEIFER in Milk, calved in 1917 or 1918.— Premiums, £10, £5, and £3.

1st	No. 291	Trustees of Alasdair W. M'Robert, Douneside, Tarland, "Tarvin Hatsumer" (31,076).
2nd	No. 293	Andrew Spence, Commieston, Montrose, "Commieston Watch" (28,062).
3rd	No. 294	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Irene" (33,110).
C	No. 292	William Sinclair, Loirston, Nigg, Aberdeen, "Kirkhill Lady Nellie" (29,476).

CLASS 41. HEIFER in Calf, with her first calf to calve before 3 years old.—Premiums, £10, £5, and £3.

1st	No. 304	William Sinclair, Loirston, Nigg, Aberdeen, "Kirkhill Nellie 7th" (34,296).
2nd	No. 299	Trustees of Roderic and Iain M'Robert, Colney Park, St Albans, Herts, "Douneside Gigha" (28,360).
3rd	No. 306	Adam Smith, Lochlands, Larbert, "Lochlands Nicol" (34,622).
V	No. 310	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Ida" (33,070).
H	No. 309	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Imgyenearschaap" (33,084).
C	No. 311	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Imp" (33,088).
C	No. 307	Adam Smith, Lochlands, Larbert, "Lochlands Cromarty" (34,604).
C	No. 301	Trustees of Alasdair W. M'Robert, Douneside, Tarland, "Norton Bessie 7th" (35,114).

CLASS 42. HEIFER, calved in 1919.—Premiums, £10, £5, and £3.

1st	No. 327	Adam Smith, Lochlands, Larbert, "Lochlands Pel Naspa."
2nd	No. 328	Andrew Spence, Commieston, Montrose, "Commieston Hope."
3rd	No. 331	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Jungfrau."
V	No. 319	George Findlay, Glasslaw, Stonehaven, "Finlay Milkmaid 4th."
H	No. 322	G. A. Francis, West Seaton, Arbroath, "Seaton Empress."
C	No. 318	George Findlay, Glasslaw, Stonehaven, "Findlay Zoe."
C	No. 330	Andrew Spence, Commieston, Montrose, "Commieston Fannie."
C	No. 332	Major D. A. Spence, V.D., Dunninald Mains, Montrose, "Dunninald Jay."
C	No. 320	A. Dingwall Fordyce, Brucklay Castle, Brucklay, "Shevado Luck."

FAT CATTLE.

PRESIDENT'S CHAMPION MEDAL for best Fat Animal.

No. 340 A. W. Howison, Lochbank, Blairgowrie (Aberdeen-Angus Shorthorn).

CLASS 43. OX, any pure Breed or Cross, calved after 1st December 1917.—Premiums, £5 and £2.

1st	No. 335	Alexander Rhind, Muirton, Forres (Aberdeen-Angus Cross).
2nd	No. 334	Sir John R. Gladstone, Bart. of Fasque, Fettercairn (Shorthorn—Aberdeen-Angus).
C	No. 336	Alexander Rhind, Muirton, Forres (Aberdeen-Angus Cross).
C	No. 337	George Stables, Alton Cairnie, Ruthven, by Huntly (Aberdeen-Angus Bull and Cross Cow).

CLASS 44. OX, any pure Breed or Cross, calved after 1st December 1918.—Premiums, £5 and £2.

1st	No. 338	R. S. M'William, Stoneytown, Mulben S.O., "Foch" (Shorthorn).
2nd	No. 339	Mrs K. M. Smith, Pittodrie Home Farm, Pitcaple (Aberdeen-Angus).

CLASS 45. HEIFER, any pure Breed or Cross, calved after 1st December 1917.—Premiums, £5 and £2.

(*No Entry.*)

CLASS 46. HEIFER, any pure Breed or Cross, calved after 1st December 1918.—Premiums, £5 and £2.

1st	No. 340	A. W. Howison, Lochbank, Blairgowrie (Aberdeen-Angus Shorthorn).

HORSES.

FOR AGRICULTURAL PURPOSES.

DRAUGHT STALLIONS.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Stallion or Colt.

No. 382. Andrew M. Montgomerie, of Nether Hall, Castle-Douglas, "Fyvie Sensation" (20,042).

Breeder of best Male Animal of any age in Classes 47, 48, 49, *and* 50—The Silver Medal.

No. 382 J. & P. Donald, Lethen, Fyvie.

CLASS 47. STALLION, foaled before 1917.—Premiums, £20, £15, £10, and £4.

1st No. 349 James Kilpatrick, Craigie Mains, Kilmarnock, "Craigie Masterstroke" (19,072).
2nd No. 345 George A. Ferguson, Surradale, Elgin, "Ardendale" (18,993).
3rd No. 344 George A. Ferguson, Surradale, Elgin, "Dunure Kaleidoscope" (18,335).
4th No. 348 James Kilpatrick, Craigie Mains, Kilmarnock, "Craigie Excelsior" (18,664).
V No. 346 John Hastie, Eddlewood Farm, Hamilton, "Dunure Recollection" (18,339).
H No. 351 John Pollock, Byres Farm, Pollokshaws, "Royal Raeburn" (18,900).

CLASS 48. ENTIRE COLT, foaled in 1917.—Premiums, £20, £15, £10, and £4.

1st No. 359 Andrew M. Montgomery of Nether Hall, Castle-Douglas, "Carry On" (19,655).
2nd No. 362 A. M. Simpson, Whitecross, East Kilbride, "High Style."
3rd No. 365 William Veitch, Drumry Mains, Drumchapel, "Drumry Reformer" (19,698).
4th No. 357 James Greig, Hilton of Fern, Brechin, "Hilton Autocrat" (19,751).
C No. 363 George Todd, Wellbrae, Glassford, "Master Print" (20,100).

CLASS 49. ENTIRE COLT, foaled in 1918.—Premiums, £20, £15, £10, and £4.

1st No. 382 Andrew M. Montgomery of Nether Hall, Castle-Douglas, "Fyvie Sensation" (20,042).
2nd No. 372 George A. Ferguson, Surradale, Elgin, "*Premierdale*" *(20,140)*
3rd No. 383 Andrew M. Montgomery of Nether Hall, Castle-Douglas, "Dunraven."
4th No. 385 John Pollock, Byres Farm, Pollokshaws, "Lawmuir" (20,090).
V No. 376 James Hamilton, Dunduff, Ayr, "Dunure Flowerman" (20,007).
H No. 374 James Gray, Birkenwood, Gargunnock, "Risque."

CLASS 50. ENTIRE COLT, foaled in 1919.—Premiums, £15, £10, £6, and £4.

1st No. 400 Andrew M. Montgomery of Netherhall, Castle-*Douglas*, "*Threave* Seal."
2nd No. 392 J. & R. Cocker, Hill of Petty, Fyvie, "Bonnie Fyvie."
3rd No. 396 James Gray, Birkenwood, Gargunnock, "*Vim.*"
4th No. 402 Walter Robertson, Auchinleck Farm, Duntocher, "Auchinleck *Impression.*"
V No. 397 James Kilpatrick, Craigie Mains, Kilmarnock, "Craigie Premier."
H No. 395 George A. Ferguson, Surradale, Elgin, "Silverdale"
C No. 394 George A. Ferguson, Surradale, Elgin, "Crowndale."
C No. 387 David Adams, Auchencraig, Dumbarton, "George Craig"
C No 399 John M M'Kean, Dalhousie, Bonnyrigg
C No. 389 George Argo, Petty, Fyvie, "Petty Footguard."

DRAUGHT GELDINGS.

PRESIDENT'S CHAMPION MEDAL for best Draught Gelding.

No. 409 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison Street, Glasgow, "Bob."

Class 51. DRAUGHT GELDING, foaled before 1917.—
Premiums, £10, £5, and £3.

1st No. 409 Scottish Co-operative Wholesale Society, Ltd, 95 Morrison Street, Glasgow, "Bob."
2nd No. 405 David Adams, Auchencraig, Dumbarton, "Renwick."
3rd No. 410 William S. Miller, Balmanno, Bridge of Earn, "Charlie."
V No. 406 J. & J. Cunningham, Ltd, 44 Bernard Street, Leith, "Johnnie."
H No. 408 Robert Pettigrew, Millerwood, Airdrie, "Wullie Wyllie."

Class 52. DRAUGHT GELDING, foaled in 1917.—Premiums, £6, £4, and £3.

1st No. 417 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison Street, Glasgow, "Johnny."
2nd No. 416 William Reith, Kennerty Dairy Farm, Peterculter, "Topline."
3rd No. 415 William S. Miller, Balmanno, Bridge of Earn, "Jock."
H No. 413 William Kerr, Old Graitney, Gretna, Carlisle, "Jack."
C No. 412 John Barron, Cabra, Mintlaw, Aberdeenshire, "Prince."

Class 53. DRAUGHT GELDING, foaled in 1918.—Premiums, £6, £4, and £3.

1st No. 422 John Duff, Leys of Dun, Montrose, "Jim Scott."
2nd No. 424 Scottish Co-operative Wholesale Society, Ltd., 95 Morrison Street, Glasgow, "Hughie."
3rd No. 423 William S. Miller, Balmanno, Bridge of Earn, "Farmer."
V No. 425 John L. Sleigh, Newseat of Tolquhon, Tarves, "Wattie."
H No. 420 J. Baird & Co. (Falkirk), Limited, Springfield Saw Mills, Falkirk, "Kitchener."
C No. 419 George Argo, Petty, Fyvie, "Bruce."

DRAUGHT MARES AND FILLIES.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Mare or Filly.

No. 435 F. L. Wallace, Balcairn, Old Meldrum, "Veda" (48,672).

Fife and Kinross Perpetual Gold Challenge Cup, value £200, *for best Clydesdale Mare or Filly, "Extra Stock" being eligible to compete.* This Cup, along with an endowment of £400, was subscribed for by the Counties of Fife and Kinross in commemoration of the Society's first Show at Cupar-Fife in 1912.

No. 435 F. L. Wallace, Balcairn, Old Meldrum, "Veda" (48,672).

Best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book—Cawdor *Challenge Cup, value 50 guineas, given by the Clydesdale Horse Society.*

No. 435 F. L. Wallace, Balcairn, Old Meldrum, "Veda" (48,672).

Class 54. MARE of any age, with Foal at foot.—Premiums, £20, £12, £7, and £4.

1st No. 435 F. L. Wallace, Balcairn, Old Meldrum, "Veda" (48,672).
2nd No. 431 D. D. Murray, The Dean, Seaham Harbour, "Queen o' the Ring" ([illegible])
3rd No. 429 William Meiklem, Begg, Kirkcaldy, "Maud."
4th No. 434 John P. Sleigh, St John's Wells, Fyvie, "Wells Meryl" (49,009).
V No. 438 John P. Sleigh, St John's Wells, Fyvie, "Gaya."
H No. 430 *The Earl of Minto, Minto House, Hawick, (Percheron) "Janette" (141).*

CLASS 55. YELD MARE, foaled before 1917.—Premiums, £12, £9, £6, and £4.

1st No. 489 F. Calvert Butler & F. J. Dickens, Red Court, Carnforth, Lancashire, "Farleton Lady Alice."
2nd No. 441 J. & R. Cocker, Hill of Petty, Fyvie, "Sunray" (47,384).
3rd No. 446 J. P. Sleigh, St John's Wells, Fyvie, "Naila" (49,006).
4th No. 436 George Anderson, West Fingask, Old Meldrum, "Fine Feathers."
V No. 440 George Clyne, Noss House, Wick, "Lady Carmen" (40,632).
H No. 438 Samuel Brown, Culraven, Kirkcudbright, "Culraven Sunray" (44,773).
C No. 444 Alexander Kennedy, Blackhall Farm, Dunfermline, "May Mischief" (45,721).
C No. 445 William Reith, Kennerty Farm, Peterculter, Aberdeenshire, "Verona."

CLASS 56. YELD MARE or FILLY, foaled in 1917.—Premiums, £12, £9, £6, and £4.

1st No. 450 James Kilpatrick, Craigie Mains, Kilmarnock, filly, "Craigie Sunray."
2nd No. 454 John P. Sleigh, St John's Wells, Fyvie, filly, "Blackwood Dawn."
3rd No. 455 F. L. Wallace, Balcairn, Old Meldrum, filly, "Mirabelle."
4th No. 449 Joseph Harper, Rathillet, Cupar-Fife, filly, "St Anne."
V No. 456 F. L. Wallace, Balcairn, Old Meldrum, filly, "Princess II. of Airieland."
H No. 451 Robert Marshall, Mains of Kilmaronock, by Alexandria, mare, "Lochlands Lady Mary."

William Taylor Memorial Prize of £10 and Certificate *to the Breeder of the best Clydesdale Filly entered in Classes* 57 *or* 58—given by William Taylor Memorial Committee.

No. 459. James Gray, Birkenwood, Gargunnock.

CLASS 57. FILLY, foaled in 1918.—Premiums, £12, £9, £6, and £4.

1st No 459 James Gray, Birkenwood, Gargunnock, "Peace."
2nd No. 462 J. E. Kerr of Harviestoun, Dollar, "Harviestoun Felecia."
3rd No. 460 David Hastie & Sons, Eddlewood Farm, Hamilton, "Eddlewood Ideal."
4th No. 471 F. L. Wallace, Balcairn, Old Meldrum, "Dunure Maud."
V No. 468 Alexander B. Rennie, Tifty, Fyvie, "Sheila."
H No. 470 John W. Smith, Knabbygates, Knock, Keith, "Lady Victor."
C No. 458 William S. Dean, Jointurelands, Urquhart, Elgin, "Jewel."

CLASS 58. FILLY, foaled in 1919.—Premiums, £12, £9, £6, and £4.

1st No. 487 Robert Young, Parkhall, Polmont, "Perfect Lady."
2nd No. 472 F. Calvert Butler and F. J. Dickens, Red Court, Carnforth, Lancs., "Farleton Harmony."
3rd No. 486 F. L. Wallace, Balcairn, Old Meldrum, "Dunure Syrene."
4th No. 481 The Duke of Portland, K.G., Langwell, Berriedale, Caithness, "Langwell Lady Litigant."
V No. 475 Lord Forteviot of Dupplin, Dupplin Castle, Perth, "Genista."
H No. 484 J. P. Sleigh, St John's Wells, Fyvie, "Wells Nescal."
C No. 476 John Merson, Millhill, Gartly, "Millhill Snowflake."

HUNTERS.

PRESIDENT'S CHAMPION MEDAL for best Hunter.

No. 493 Moffat S. Thomson, Spotsmains, Kelso, "Flannelette" (5681).

CLASS 59. HUNTER BROOD MARE, with Foal at foot.—Premiums, £15, £7, and £3.

(No Entry.)

Best Hunter Filly, not exceeding three years old, registered with a number in the Hunter Stud-Book, or the entry tendered within a month of the award—Champion Gold Medal, given by the Hunters' Improvement and National Light Horse Breeding Society.

No. 493 Moffat S. Thomson, Spotsmains, Kelso, "Flannelette" (5681).

CLASS 60. YELD MARE, FILLY, or GELDING, for field, foaled in 1917—*in hand.*—Premiums, £10, £5, and £3.

1st No. 489 Richard Leitch, Lennelhill, Coldstream, gelding.

CLASS 61. YELD MARE, FILLY, or GELDING, for field, foaled in 1918—*in hand.*—Premiums, £10, £5, and £3.

1st No. 493 Moffat S. Thomson, Spotsmains, Kelso, filly, "Flannelette" (5681).
2nd No. 492 Richard Leitch, Lennelhill, Coldstream, gelding.

CLASS 62. COLT, GELDING, or FILLY, foaled in 1919, the produce of thoroughbred Stallion or Registered Hunter sire, out of Mare of any breed.—Premiums, £10, £5, and £3.

1st No. 494 Miss Mary A. Dalrymple, Elliston, St Boswells, filly, "Pride."
2nd No. 495 Moffat S. Thomson, Spotsmains, Kelso, colt, "Glad Rags."

HACKNEYS.

(ALL SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Hackney in Classes 63 *to* 67.

No. 502 Walter Briggs, Linden Hall, Borwick, Carnforth, Lancashire, "Adbolton Kingmaker" (12,274).

Champion Prize of £10 offered by the Hackney Horse Society *for best Mare or Filly in Hackney or Pony Classes, animals entered as " Extra Stock " being eligible.*

No. 496 Sir Lees Knowles, Bart., C.V.O., O.B.E., T.D., Westwood, Pendlebury, "Slashing Dorothy" (23,769).

CLASS 63. BROOD MARE, over 14 Hands, with Foal at foot, or to foal this season to a registered Sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1st No. 496 Sir Lees Knowles, Bart., C.V.O., O.B.E., T.D., Westwood, Pendlebury, "Slashing Dorothy" (23,769).
2nd No. 497 J. M. MacDonald, Braerannoch, Inverness, "Albania of Inverness" (21,201).

CLASS 64. YELD MARE or FILLY, foaled in 1917. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1st No. 489 Enoch Glen, Kaim Park, Bathgate, filly, "Danum Becky" (24,853).

CLASS 65. ENTIRE COLT or FILLY, foaled in 1918. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

(*Not Forward.*)

CLASS 66. ENTIRE COLT or FILLY, foaled in 1919. Eligible for Entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1st No. 501 J. M. MacDonald, Braerannoch, Inverness, filly (24,933).

CLASS 67. STALLION, foaled in or before 1917, over 14 hands. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1st No. 502 Walter Briggs, Linden Hall, Borwick, Carnforth, Lancashire, "Adbolton Kingmaker" (12,274).
2nd No. 505 Robert Scott, Thornhouse, Carluke, "Goldfoss" (13,209).
3rd No. 504 J. M. MacDonald, Braerannoch, Inverness, "Danum Orchid" (13,497).

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded:—

No. 507 Campbells, Limited, 15 Bon-Accord Street, Aberdeen, hackney gelding, "Jockie."

The following was Highly Commended, and a Medium Silver Medal awarded:—

No. 508 John Edwards, South Kirkhill, Balnagask, Aberdeen, hackney mare, "Kirkhill Modesty."

The following was Commended, and a Bronze Medal awarded:—

No. 506 Campbells, Limited, 15 Bon-Accord Street, Aberdeen, hackney mare, "Tibbie."

PONIES.

PRESIDENT'S CHAMPION MEDAL for best Pony.

No. 509 J. E Kerr of Harviestoun, Dollar, "Masquerader."

CLASS 68. STALLION, 3 years old and upwards, 14 Hands and under—*in hand.*—Premiums, £5, £3, and £2.

1st No. 509 J. E. Kerr of Harviestoun, Dollar, "Masquerader."

CLASS 69. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 13 and not over 14 Hands—*in saddle*—Premiums, £5, £3, and £2.

1st No. 510 J. E. Kerr of Harviestoun, Dollar, mare, "Harviestoun Erica."

CLASS 70. YELD MARE, FILLY, or GELDING, 3 years old and upwards, not over 13 Hands—*in saddle.*—Premiums, £5, £3, and £2.

1st No. 511 J. M. MacDonald, Braerannoch, Inverness, gelding, "Home Wood Model," late "Skirbeck Model" (12,356).

HIGHLAND PONIES

PRESIDENT'S CHAMPION MEDAL for best Highland Pony.

No 521 Miss Kathleen Mackenzie of Farr, Farr, Daviot, Inverness-shire, "Starlight."

Special Prize of £10, 10s. *for the Best Animal in Classes* 71 *to* 74—given by the late Mr John C. Robertson, Fodderty.

No. 521 Miss Kathleen Mackenzie of Farr, Farr, Daviot, Inverness-shire, "Starlight."

Special Prize of £15 *for the best Highland or Western Island Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete*—given by the National Pony Society.

No. 534 Miss H. M. Duguid, Manar, Inverurie, "Morar" (3035).

CLASS 71. STALLION, 3 years old or upwards, not exceeding 14.2 Hands.—Premiums, £8, £4, and £2.

1st No. 512 The Earl of Ancaster, Glenartney Forest, Comrie, "Ronald II." (887).
2nd No. 513 The Earl of Ancaster, Glenartney Forest, Comrie, "An Sealgair."

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded:—

No. 514 The Marquis of Graham, C.B., Brodick Castle, "Glen Bernesdale."

Class 72. MARE, 3 years old or upwards, not exceeding 14.2 Hands, Yeld or with Foal at foot.—Premiums, £8, £4, and £2.

1st No. 521 Miss Kathleen Mackenzie of Farr, Farr, Daviot, Inverness-shire, "Starlight."
2nd No. 517 James M. Cairns, Coulshill, Auchterarder, "Lona of Coulshill" (3773).
3rd No. 516 Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Lady Jean II." (3071).
H No. 522 William Dalziel Mackenzie of Farr, Farr, Daviot, Inverness-shire, "Banchor" (2182).
C No. 523 Dyson Perrins of Ardross, Alness, Ross-shire, "Maisie."

Class 73. ENTIRE COLT, foaled after 1st January 1918.—Premiums, £6, £4, and £2.

1st No. 525 The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Fender Laddie" (977).
2nd No. 526 Alexander Cowan of Loganhouse, Valleyfield, Penicuik, "Prince Archibald" (978).

Class 74. FILLY, foaled after 1st January 1918.—Premiums, £6, £4, and £2.

1st No. 528 Alexander Cowan of Loganhouse, Valleyfield, Penicuik, "Calliach Bhan IV." (3462).
2nd No. 527 The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Elsie II." (3874).
3rd No. 529 Marquis of Graham, C.B., Brodick Castle, "Isle of Arran Mysie."

WESTERN ISLAND PONIES.

PRESIDENT'S CHAMPION MEDAL for best Western Island Pony.

No. 534. Miss H. M. Duguid, Manar, Inverurie, "Morar" (3035).

Class 75. STALLION, 3 years old or upwards, not exceeding 14.2 Hands.—Premiums, £8, £4, and £2.

(No Entry.)

Special Prize of £10 *for best Highland or Western Island Mare, not exceeding* 13.2 *Hands, likely to breed a good Pit Pony, registered in the Highland Section of the National Pony Stud-Book*—given by Lanarkshire Coalmasters' Association.

No. 533 Allan J. Bowie, Thrushcraig, Paisley, "Thrushcraig Ideal" (3116).

Class. 76. MARE, 3 years old or upwards, not exceeding 14.2 Hands, Yeld or with Foal at foot.—Premiums, £8, £4, and £2.

1st No. 534 Miss H. M. Duguid, Manar, Inverurie, "Morar" (3035).
2nd No. 535 Miss M. Duguid, Manar, Inverurie, "Linnhe" (2971).
3rd No. 532 The Duke of Atholl, K.T., Blair Castle, Blair Atholl, "Midge" (3872).
V No. 537 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Cairnburgh" (3824).
H No. 530 The Earl of Ancaster, Glenartney Forest, Comrie, "Shena of Coulshill" (3480).
H No. 533 Allan J. Bowie, Thrushcraig, Paisley, "Thrushcraig Ideal" (3116).

Class 77. ENTIRE COLT, foaled after 1st January 1918.—Premiums, £6, £4, and £2.

No. 539 J. H. Munro Mackenzie of Calgary, Isle of Mull, "Cairnmor'

Class 78. FILLY, foaled after 1st January 1918.—Premiums, £6, £4, and £2.

No. 540 Dyson Perrins of Ardross, Alness, Ross-shire "Flora."

SHETLAND PONIES.

(ALL SHOWN IN HAND).

PRESIDENT'S CHAMPION MEDAL for best Shetland Pony.

No. 563 P. F. Manson, Maryfield, Bressay, Lerwick, "Bright Blossom" (3109).

Silver Medal *for the best Shetland Pony of the sex opposite to that of the winner of the President's Champion Medal, entered or eligible for entry in the Shetland Pony Stud-Book*—given by the Shetland Pony Stud-Book Society.

No. 541 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Huzzoor of Penniwells" (864).

CLASS 79. STALLION, not exceeding 10½ Hands, foaled before 1917.—Premiums, £8, £5, £3, and £2.

1st	No. 541	Mrs Etta Duffus, Penniwells, Elstree, Herts, "Huzzoor of Penniwells" (864).
2nd	No. 548	P. F. Manson, Maryfield, Bressay, Lerwick, "Pole Star" (884).
3rd	No. 543	Miss H. M. Duguid, Manar, Inverurie, "Braco" (746).
4th	No. 547	R. W. R. Mackenzie, Earlshall, Leuchars, "Why Not of Earlshall" (898).
V	No. 542	Mrs Etta Duffus, Penniwells, Elstree, Herts, "Bravado of Penniwells."
H	No. 544	Miss J. T. Irvine Fortescue, Craigness, Muchalls, "Runic of Earlshall."

CLASS 80. ENTIRE COLT, not exceeding 10½ Hands, foaled in 1917 or 1918.—Premiums, £8, £5, £3, and £2.

1st	No. 554	Alexander Smith, Roorkee, Urie Crescent, Stonehaven, "St Quentin."
2nd	No. 553	R. W. R. Mackenzie, Earlshall, Leuchars, "Evian of Earlshall."
3rd	No. 550	Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow "Playfellow of Auchlochan."
4th	No. 551	Mrs Etta Duffus, Penniwells, Elstree, Herts, "Loganberry of Penniwells."
V	No. 549	Miss E. Broughton, Southfield, Leuchars, "Stockwell."
H	No. 552	Joseph Duncan, 35A Union Street, Aberdeen, "Fashon."

Shetland Pony Foal, exhibited along with Dam in Class 81—Premiums, £5, £3, and £2, given by "Four Lovers of the Breed," per Mr W. Mungall of Transy.

1st	No. 563	P. F. Manson, Maryfield, Bressay, Lerwick, "Bright Blossom" (3109).
2nd	No. 558	Mrs Etta Duffus, Penniwells, Elstree, Herts, "Mayfly of Penniwells" (2582).
3rd	No. 559	Miss J. T. Irvine Fortescue, Craigness, Muchalls, "Hedera" (2799).

CLASS 81. MARE, not exceeding 10½ Hands, with Foal at foot.—Premiums, £8, £5, £3, and £2.

1st	No. 563	P. F. Manson, Maryfield, Bressay, Lerwick, "Bright Blossom" (3109).
2nd	No. 558	Miss Etta Duffus, Penniwells, Elstree, Herts, "Mayfly of Penniwells" (2582).
3rd	No. 560	J. E. Kerr, Harviestoun, Dollar, "Piarella."
4th	No. 559	Miss J. T. Irvine Fortescue, Craigness, Muchalls, "Hedera" (2799).
V	No. 565	Alexander Sleigh, St John's Wells, Fyvie, "Huntly Trifle" (3288).
H	No. 562	R. W. R. Mackenzie, Earlshall, Leuchars, "Bertha of Blackcombe."

CLASS 82. YELD MARE, not exceeding 10½ Hands.—Premiums, £8, £5, £3, and £2.

1st No. 569 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Mayflower of Penniwells."
2nd No. 574 J. E. Kerr, Harviestoun, Dollar, "Bagatelle" (2895).
3rd No. 575 R. W. R. Mackenzie, Earlshall, Leuchars, "Brenda of Earlshall" (3391).
4th No. 573 Miss J T. Irvine Fortescue, Craigness, Muchalls, "Brayela of Mondynes."
V No. 571 Miss J. T. Irvine Fortescue, Craigness, Muchalls, "Monachedin" (3[illegible]
H No. 566 Archibald Aitken, Blackdams, Culleslie, Echt, Aberdeen, "Polly Perkins."

CLASS 83. FILLY, not exceeding 10½ Hands, foaled in 1917 or 1918.—Premiums, £8, £5, £3, and £2.

1st No. 579 Mrs Etta Duffus, Penniwells, Elstree, Herts, "Maybloom of Penniwells."
2nd No. 583 Alexander Sleigh, St John's Wells, Fyvie, "Lucilla of St John's Wells."
3rd No. 582 Norman J. Nasmyth of Glen Farg, Abernethy, "Silvertail of Glen Farg."
4th No. 577 Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, "Erica of Auchlochan."
V No. 581 R. W R. Mackenzie, Earlshall, Leuchars, "Thora of Lassodie."
H No. 578 Charles Douglas, D.Sc., C B, of Auchlochan, Lesmahagow, "Blackberry of Auchlochan."

HORSES IN HARNESS.

PRESIDENT'S CHAMPION MEDAL for best Animal in the Classes for Horses in Harness.

No 590 William S Miller, Balmanno, Bridge of Earn, "V C."

CLASS 84. YELD MARE, FILLY, or GELDING, any age, in Harness, 15 Hands and upwards, to be driven in the ring.—Premiums, £10, £5, and £3.

1st No 586 J. M MacDonald, Braerannoch, Inverness, "St Felio" (12,917).
2nd No. 584 D. A. Anderson, 80 Crossgate, Cupar-Fife, "Rowan Mathias."
3rd No. 507 Campbells, Limited, 15 Bon-Accord Street, Aberdeen, Hackney Gelding, "Jockie."

Special Prize of £5 *for best Pony in Class* 85, *under* 13 *Hands.*

No. 589 J. M MacDonald, Braerannoch, Inverness, "Home Wood Model" (late "Skerbeck Model") (12,356).

CLASS 85. YELD MARE, FILLY, or GELDING, any age, in Harness, under 15 Hands, to be driven in the ring.—Premiums, £10, £5, and £3.

1st No. 590 William S. Miller, Balmanno, Bridge of Earn, "V.C."
2nd No. 589 J. M. MacDonald, Braerannoch, Inverness, "Home Wood Model" (late "Skerbeck Model") (12,356).
3rd No. 506 Campbells, Limited, 15 Bon-Accord Street, Aberdeen, Hackney Mare, "Tibbie."

JUMPING COMPETITIONS.

Champion Prize of £10 for the most points in Prizes with one or more Horses in Classes 1, 2, *and* 3.

CONDITIONS.—First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; Fifth Prize, one point. The money to be evenly divided in the event of a tie.

Frank Allison, West Farm, Selby, Yorks.

Wednesday, 21st July.

CLASS 1. HORSE or PONY, any height.—Premiums, £20, £15, £10, £5, and £3.

1st Frank Allison, West Farm, Selby, Yorks, Mare, "Temptress," brown.
2nd Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Aviator," chestnut.
3rd Ernest Bradley, Newton Grange, Great Ayton, Yorks, Gelding, "Spider," brown.
4th Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Pop-Over," black.
5th A. J. Auchterlonie, Leckerston, Dunfermline, Mare, "Lena," black.

Thursday, 22nd July.

CLASS 2. HORSE or PONY, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1.—Premiums, £10, £8, £5, £3, and £2.

1st Frank Allison, West Farm, Selby, Yorks, Mare, "Temptress," brown.
2nd Ernest Bradley, Newton Grange, Great Ayton, Yorks, Gelding, "Spider," brown.
3rd Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny," dark chestnut.
4th A. J. Auchterlonie, Leckerston, Dunfermline, Mare, "Lena," black.
5th A. R. Young, 41 Gordon Street, Paisley, Mare, "Marjorie," bay, 7 years.

Friday, 23rd July.

CLASS 3. HORSE or PONY, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2.—Premiums, £10, £8, £5, £3, and £2.

1st Frank Allison, West Farm, Selby, Yorks, Mare, "Temptress," brown.
2nd Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Aviator," chestnut.
3rd Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Pop-Over," black.
4th Ernest Bradley, Newton Grange, Great Ayton, Yorks, Gelding, "Spider," brown.
5th Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny," dark chestnut.

Wednesday Evening, 21st July.

CLASS 4. HORSE or PONY, any height.—Premiums, £10, £8, £5, £3, and £2.

1st Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Aviator," chestnut.
2nd Frank Allison, West Farm, Selby, Yorks, Mare, "Temptress," brown.
3rd Ernest Bradley, Newton Grange, Great Ayton, Yorks, Gelding, "Spider," brown.
4th Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Pop-Over," black.
5th Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny," dark chestnut.

Thursday Evening, 22nd July.

CLASS 5. HORSE or PONY, any height.—Premiums, £10, £8, £5, £3, and £2.

1st Frank Allison, West Farm, Selby, Yorks, Mare, "Temptress," brown.
2nd Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Aviator," chestnut.
3rd Ernest Bradley, Newton Grange, Great Ayton, Yorks, Gelding, "Spider," brown.
4th Miss Gladys Trail, Riding Academy, Aberdeen, Gelding, "Pop-Over," black.
5th Alistair S. T. Russell, 7 Comely Bank Terrace, Edinburgh, Mare, "Blinkbonny," dark chestnut.

SHEEP.

BLACKFACE.

PRESIDENT'S CHAMPION MEDAL for best animal of Blackface breed.

No. 594 Charles Cadzow, Borland, Dunsyre, Carstairs Junction, "Snowdrift."

CLASS 86. TUP above one Shear.—Premiums, £12, £8, £4, and £2.

1st	No. 594	Charles Cadzow, Borland, Dunsyre, Carstairs Junction, "Snowdrift."
2nd	No. 599	M. G. Hamilton, Woolfords, Cobbinshaw.
3rd	No. 601	D. & T. Lindsay, Ascreavie, Kirriemuir.
4th	No. 592	W. W. Anderson, Colzium, Kirknewton, "Highland Blend."
V	No. 598	M. G. Hamilton, Woolfords, Cobbinshaw.
H	No. 604	David Reid, Crofts of Glenmuick, Ballater.
C	No. 602	D. & T. Lindsay, Ascreavie, Kirriemuir.
C	No. 597	Alexander Cowan of Loganhouse, Valleyfield, Penicuik, "Graham's Pride."

CLASS 87. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1st	No. 611	Charles Cadzow, Borland, Dunsyre, Carstairs Junction.
2nd	No. 610	Charles Cadzow, Borland, Dunsyre, Carstairs Junction.
3rd	No. 617	M. G. Hamilton, Woolfords, Cobbinshaw.
4th	No. 613	Charles Cadzow, Borland, Dunsyre, Carstairs Junction.
V	No. 612	Charles Cadzow, Borland, Dunsyre, Carstairs Junction.
H	No. 619	M. G. Hamilton, Woolfords, Cobbinshaw.
C	No. 614	Charles Cadzow, Borland, Dunsyre, Carstairs Junction.
C	No. 618	M. G. Hamilton, Woolfords, Cobbinshaw.

CLASS 88. SHEARLING TUP, which shall have been entirely outwintered, and which shall not have been clipped *before* 1st May 1920.—Premiums £12, £8, £4, and £2.

1st	No. 634	D. & T. Lindsay, Ascreavie, Kirriemuir.
2nd	No. 633	A. W. Howison, Rannagulzion, Blairgowrie.
3rd	No. 630	Alexander Cowan of Loganhouse, Valleyfield, Penicuik.
4th	No. 627	W. W. Anderson, Colzium, Kirknewton.
V	No. 629	Alexander Cowan of Loganhouse, Valleyfield, Penicuik.
H	No. 628	Alexander Cowan of Loganhouse, Valleyfield, Penicuik.
C	No. 636	Alexander Whyte, Easter Denoon, Glamis.

Special Prize of £10 *for best Blackface Ewe in Class* 89—given by Miss J. Edith Forrester, Ballater.

No. 653 W. W. Anderson, Colzium, Kirknewton, "Effie Deans."

CLASS 89. EWE above one Shear, with her Lamb at foot.—Premiums, £10, £5, and £2.

1st	No. 639	The Earl of Ancaster, Corrychrone, Callander.
2nd	No. 640	W. W. Anderson, Colzium, Kirknewton.
3rd	No. 646	D. & T. Lindsay, Ascreavie, Kirriemuir.
V	No. 652	John Robson, Newton, Bellingham.
H	No. 648	Octavius Monkhouse, Cowshill, Wearhead, Co. Durham.
C	No. 650	David Reid, Crofts of Glenmuick, Ballater.
C	No. 647	D. & T. Lindsay, Ascreavie, Kirriemuir.

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded :—

No. 653 W. W. Anderson, Colzium, Kirknewton, "Effie Deans."

CLASS 90. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1st	No. 655	W. W Anderson, Colzium, Kirknewton, "Lady Lothian."
2nd	No. 654	The Earl of Ancaster, Corrychrome, Callander.
3rd	No. 659	D. & T Lindsay, Ascreavie, Kirriemuir
V	No. 661	Octavius Monkhouse, Cowshill, Wearhead, Co Durham.
H	No 660	D. & T Lindsay, Ascreavie, Kirriemuir
C	No 662	Octavius Monkhouse, Cowshill, Wearhead, Co. Durham.

CHEVIOT.

PRESIDENT'S CHAMPION MEDAL for best animal of the Cheviot breed.

No. 686 John Elliot, Blackhaugh, Clovenfords.

CLASS 91 TUP above one Shear —Premiums, £12, £8, £4, and £2.

1st	No 675	John Robson, Milknowe, Duns, "Victory's Loin."
2nd	No 666	J W. Aitchison, Linhope, Hawick.
3rd	No 677	Messrs Shiell, Sourhope, Kelso, "Flemington Masterpiece" (3155).
4th	No. 670	Arthur Elliot, Hindhope, Jedburgh
V	No 676	Robson & Dodd, Newton, Bellingham, "Yearle Whin."
H	No. 667	J. W. Aitchison, Linhope, Hawick, "Gay Crusader."
C	No 674	John Robson, Newton, Bellingham

CLASS 92. SHEARLING TUP —Premiums, £12, £8, £4, and £2.

1st	No 686	John Elliot, Blackhaugh, Clovenfords
2nd	No 693	Messrs Shiell, Sourhope, Kelso, "Border Reiver."
3rd	No 688	John Elliot, Blackhaugh, Clovenfords
4th	No 684	Arthur Elliot, Hindhope, Jedburgh
V	No. 689	John Elliot, Blackhaugh, Clovenfords.
H	No. 679	J. W Aitchison, Linhope Hawick
C	No. 687	John Elliot, Blackhaugh, Clovenfords.

CLASS 93. EWE above one Shear, with her Lamb at foot —Premiums, £10, £5, and £2.

1st	No 699	Arthur Elliot, Hindhope Jedburgh
2nd	No. 698	Arthur Elliot, Hindhope, Jedburgh.
3rd	No 695	J. W Aitchison, Linhope, Hawick
V	No 697	John Stodart Dickson, Flemington, Dolphinton, "Lady Jen
H	No 703	John Robson, Millknowe, Duns
C	No 696	J W. Aitchison, Linhope, Hawick.

CLASS 94. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2

1st	No. 705	J. W. Aitchison, Linhope, Hawick
2nd	No. 716	Simon Rutherford, Overhall, Hawick
3rd	No 714	John Robson, Millknowe, Duns
V	No 708	Arthur Elliot, Hindhope, Jedburgh.
H	No. 711	John Elliot, Blackhaugh, Clovenfords.
C	No. 715	John Robson, Millknowe, Duns.

BORDER LEICESTER

PRESIDENT'S CHAMPION MEDAL for best animal of Border Leicester

No. 724 William R Ross, Milton of Culloden, Inverness, "Dauntless £600" (5092).

Tweeddale Gold Medal *for best Border Leicester Tup.*—Annual Free Income from Fund of £500.

No 724 William R. Ross, Milton of Culloden, Inverness, "Dauntless £600" (5092)

Gold Medal *for best male animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book, animals entered as "Extra Stock" not eligible*—given by the Society of Border Leicester Sheep-Breeders.

No. 724 William R. Ross, Milton of Culloden, Inverness, "Dauntless £600" (5092).

CLASS 95. TUP above one Shear—Premiums, £12, £8, £4, and £2.

1st	No. 724	William R. Ross, Milton of Culloden, Inverness, "Dauntless £600" (5092).
2nd	No. 721	William Cairns Moyes, Renmure, Inverkeilor, Montrose, "Renmore No. 1" (4946).
3rd	No. 720	T. M'Intosh, Nether Ardargie, Forgandenny, "Royal Style" (4692).
4th	No. 722	R. G. Murray & Son, Spittal, Biggar, "Spittal One Hundred" (4415).
V	No. 726	D. & W. Wallace, Auchenbrain, Mauchline, "Chapel King" (4532).
H	No. 723	William R. Ross, Milton of Culloden, Inverness, "Lord Richmont" (5180).

CLASS 96. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1st	No. 737	Andrew M. Montgomery of Nether Hall, Castle-Douglas.
2nd	No. 749	William R. Ross, Milton of Culloden, Inverness.
3rd	No. 744	Alexander Niven, Ayton, Newburgh, Fife.
4th	No 743	R. G. Murray & Son, Spittal, Biggar.
V	No. 752	John Stewart, Saughland, Tynehead.
H	No. 754	D. & W. Wallace, Auchenbrain, Mauchline.
C	No. 739	Andrew M Montgomery of Nether Hall, Castle-Douglas.
C	No. 755	D. & W. Wallace, Auchenbrain, Mauchline.

Gold Medal *for best female animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book, animals entered as "Extra Stock" not eligible*—given by the Society of Border Leicester Sheep-Breeders.

No. 779. Alexander Niven, Ayton, Newburgh, Fife.

CLASS 97. EWE above one Shear.—Premiums, £10, £5, and £2.

1st	No. 763	William R Ross, Milton of Culloden, Inverness.
2nd	No. 762	R. G Murray & Son, Spittal, Biggar.
3rd	No. 760	T. M'Intosh, Nether Ardargie, Forgandenny.
V	No. 757	Right Hon. A. J. Balfour, Whittingehame, Prestonkirk
H	No 758	Samuel Davidson, Northseat of Auchedly, Tarves.
C	No. 761	William Cairns Moyes, Renmure, Inverkeilor, Montrose.

CLASS 98. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1st	No. 779	Alexander Niven, Ayton, Newburgh, Fife.
2nd	No. 781	William R. Ross, Milton of Culloden, Inverness.
3rd	No. 778	R. G. Murray & Son, Spittal, Biggar.
V	No. 775	W. W. Hope, Phantassie, Prestonkirk.
H	No. 780	Alexander Niven, Ayton, Newburgh, Fife.
C	No. 772	Quintin Dunlop, jun., Greenan, Ayr.

HALF-BRED.

PRESIDENT'S CHAMPION MEDAL for best Half-Bred Animal.

No. 794 Thomas Armstrong, East Cote, Hawick.

CLASS 99. TUP above one Shear.—Premiums, £10, £7, and £3.

1st	No. 783	Mrs A. G. Burdon, Wooperton, Alnwick, Northumberland.

CLASS 100. SHEARLING TUP.—Premiums, £10, £7, and £3.

1st	No. 784	John Roberton, Ladyrig, Kelso.
2nd	No. 785	John Roberton, Ladyrig, Kelso.

CLASS 101. EWE above one Shear.—Premiums, £10, £5, and £2.

1st	No. 786	Mrs A. G. Burdon, Wooperton, Alnwick, Northumberland.
2nd	No. 788	John Stewart, Saughland, Tynehead.
3rd	No. 787	Right Honourable the Lord Forteviot of Dupplin, Dupplin Castle, Perth.

CLASS 102. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1st	No. 792	John Stewart, Saughland, Tynehead.
2nd	No. 789	Mrs A. G. Burdon, Wooperton, Alnwick, Northumberland.
3rd	No. 793	John Stewart, Saughland, Tynehead.
V	No. 790	Mrs A. G. Burdon, Wooperton, Alnwick, Northumberland.
H	No. 791	Right Honourable the Lord Forteviot of Dupplin, Dupplin Castle, Perth.

CLASS 103. THREE EWE LAMBS.—Premiums, £5, £3, and £2.

1st	No. 794	Thomas Armstrong, East Cote, Hawick.
2nd	No. 795	Lord Forteviot of Dupplin, Dupplin Castle, Perth.

OXFORD-DOWN.

PRESIDENT'S CHAMPION MEDAL for best Oxford-Down Animal.

No. 806 Thomas & Matthew Templeton, Sandyknowe, Kelso.

Roberton Challenge Cup, value £50, *for the best Oxford-Down animal bred in Scotland*—given by Oxford-Down Sheep-Breeders' Association.

No. 806 Thomas & Matthew Templeton, Sandyknowe, Kelso.

CLASS 104. SHEARLING TUP.—Premiums, £8, £5, and £3.

1st	No. 806	Thomas & Matthew Templeton, Sandyknowe, Kelso.
2nd	No. 800	John Roberton, Ladyrig, Kelso (343).
3rd	No 797	Robert Graham, Kaimflat, Kelso.
V	No. 805	Thomas & Matthew Templeton, Sandyknowe, Kelso.
H	No. 807	Thomas & Matthew Templeton, Sandyknowe, Kelso.
C	No. 802	John Roberton, Ladyrig, Kelso (343).

CLASS 105. SHEARLING EWE or GIMMER.—Premiums, £8, £5, and £3.

1st	No. 809	Robert Graham, Kaimflat, Kelso.
2nd	No. 818	T. & M. Templeton, Sandyknowe, Kelso.
3rd	No. 815	John Roberton, Ladyrig, Kelso (343).
V	No. 810	Robert Graham, Kaimflat, Kelso.
H	No. 819	T. & M. Templeton, Sandyknowe, Kelso.
C	No. 814	William T. Malcolm, Whittingehame Mains, Prestonkirk, East Lothian.

CLASS 106. TUP LAMB.—Premiums, £8, £5, and £3.

1st	No. 827	T. & M. Templeton, Sandyknowe, Kelso.
2nd	No. 826	Walter Rutherford, Crailing Tofts, Roxburgh.
3rd	No. 825	Walter Rutherford, Crailing Tofts, Roxburgh.
V	No. 828	T. & M. Templeton, Sandyknowe, Kelso.
H	No. 823	John Roberton, Ladyrig, Kelso (343).
C	No. 820	H. B. Ireland, Ballindean, Kilmany, Dundee.

CLASS 107. THREE EWE LAMBS.—Premiums, £8, £5, and £2.

1st	No. 830	H. B. Ireland, Ballindean, Kilmany, Dundee.
2nd	No. 831	T. & M. Templeton, Sandyknowe, Kelso.
3rd	No. 829	Mrs M. Fowlie, Parkhouse, Maud, Aberdeen.

EXTRA STOCK (TUP).

The following was Very Highly Commended, and a Silver Medal awarded:—

No. 832 John & Alexander Stephen, Overton Benwells and Auchtylan, Old Deer, Maud, tup, "Zig-Zag" (9424).

SUFFOLK.

PRESIDENT'S CHAMPION MEDAL for best Suffolk Sheep.

No. 845 W. W. Hope, The Knowes, Prestonkirk.

CLASS 108. SHEARLING TUP.—Premiums, £8, £5, and £3.

1st	No. 833	Samuel Barr, Nottylees, Kelso, "William" (15,440).
2nd	No. 835	G. Bertram Shields, Dolphingstone, Tranent, "Eaglestone" (15,803).
3rd	No. 834	William Golightly, Whitelaw, Haddington.

CLASS 109. SHEARLING EWE or GIMMER.—Premiums, £8, £5, and £3.

1st	No. 841	G. Bertram Shields, Dolphingstone, Tranent.
2nd	No. 838	William Golightly, Whitelaw, Haddington.
3rd	No. 837	Samuel Barr, Nottylees, Kelso (No. 655).
V	No. 842	G. Bertram Shields, Dolphingstone, Tranent.

CLASS 110. TUP LAMB.—Premiums, £8, £5, and £3.

1st	No. 845	W. W. Hope, The Knowes, Prestonkirk.
2nd	No. 849	G. Bertram Shields, Dolphingstone, Tranent.
3rd	No. 850	G. Bertram Shields, Dolphingstone, Tranent.
V	No 847	J. P. Ross-Taylor, Mungos Walls, Duns.
H	No. 848	J. P. Ross-Taylor, Mungos Walls, Duns.

CLASS 111. THREE EWE LAMBS.—Premiums, £8, £5, and £2.

1st	No. 855	G. Bertram Shields, Dolphingstone, Tranent.
2nd	No. 853	W. W. Hope, The Knowes, Prestonkirk.
3rd	No. 854	J. P. Ross-Taylor, Mungos Walls, Duns.
V	No. 851	Samuel Barr, Nottylees, Kelso.
H	No. 852	William Golightly, Whitelaw, Haddington.

SHROPSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Shropshire Animal.

No. 856 Thomas A. Buttar, Corston, Coupar-Angus.

CLASS 112. SHEARLING TUP.—Premiums, £6, £4, and £2.

1st	No. 856	Thomas A. Buttar, Corston, Coupar-Angus.
2nd	No. 857	Thomas A. Buttar, Corston, Coupar-Angus.
3rd	No. 858	Thomas A. Buttar, Corston, Coupar-Angus.
H	No. 859	Richard Rattray, Parkconon, Arbroath.

CLASS 113. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1st No 860 Thomas A. Buttar, Corston, Coupar-Angus.
2nd No. 861 Thomas A Buttar, Corston, Coupar-Angus.
3rd No. 863 Richard Rattray, Parkconon, Arbroath.
H No. 862 Richard Rattray, Parkconon, Arbroath.

FAT SHEEP.

CLASS 114. Three FAT LAMBS, any Breed or Cross, dropped in the year of the Show.—Premiums, £5, £3, and £2.

1st No. 867 John Robertson, Brodieshill, Forres (Suffolk tup and Leicester ewe).
2nd No 866 John Robertson, Brodieshill, Forres (Suffolk tup and Leicester ewe).
3rd No 868 Walter Rutherford, Crailing Tofts, Roxburgh.
H No 865 John Roberton, Ladyrig, Kelso (Oxford-Down tup and Suffolk ewe).
C No. 864 The Duke of Richmond and Gordon, K G , Gordon Castle, Fochabers (B.F. ewes by Southdown tup).

GOATS.

OPEN CLASSES.

PRESIDENT S CHAMPION MEDAL for best Pen of Goats.

No 879 Miss Crum Ewing, Strathleven, Dumbarton (Anglo Toggenburg), "Strathleven Maduinn" (K R 6933).

Challenge Cup, value 20 guineas, *for the best Female Goat in the Show*—given by Lord Dewar, London.

No. 879 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Toggenburg), "Strathleven Maduinn" (K R

CLASS 115 MALE GOAT, any Variety, over one year, entered or eligible for entry in the Herd Book.—Premiums, £3, £2, and £1

1st No. 871 Miss M E Duff, Earlsneuk, Elie, Fife (Anglo Nubian-Swiss), "†Prestige of Bashley" (H B 3291)
2nd No 873 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Edenbruk Klito" (A N 947)
3rd No. 872 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo-Nubian Swiss), "Ciceter Jackanapes" (3128).
H No. 874 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Edenbruk Mathias" (A N 1155).

CLASS 116. FEMALE GOAT, any Variety, over two years, entered or eligible for entry in the Herd-Book.—Premiums, £3, £2, and £1.

1st No. 877 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Sadberge Merle" (A N 972).
2nd No 876 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Sadberge Partridge" (A N 699)

CLASS 117. GOATLING, any Variety, over one and not exceeding two years, entered or eligible for entry in the Herd-Book.—Premiums, £3, £2, and £1.

1st No. 879 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Toggenburg), "Strathleven Maduinn" (K R 6933).
2nd No. 880 Miss Crum Ewing, Strathleven, Dumbarton (Anglo-Toggenburg), "Strathleven Feasgar" (H R 6982).
3rd No. 878 Miss M. E. Duff, Earlsneuk, Elie, Fife (Anglo-Nubian-Swiss), "Earlsferry White Heather" (H B 3723).

CLASS 118. MALE KID, any Variety, not exceeding one year, entered or eligible for entry in the Herd-Book.—Premiums, £3, £2, and £1.

1st No. 881 Miss M E Duff, Earlsneuk, Elie, Fife (Anglo-Nubian Swiss), "Earlsferry Snowstorm" (K R 7896, H B 4336).
2nd No. 882 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo Nubian-Swiss), "Concord of Buchanan."
3rd No. 883 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Garrochly Gruff" (K R 7848)

CLASS 119. FEMALE KID, any Variety, not exceeding one year, entered or eligible for entry in the Herd Book —Premiums, £3, £2, and £1.

1st No 885 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo-Nubian-Swiss), "Contadina of Buchanan."
2nd No 886 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Garrochiy Marabelle" (A N 1279, K R 7686).

CLASS 120. MILKING COMPETITION, open to Classes 116 and 122 (animals two years and over).—Premiums, £3, £2, and £1.

1st No 877 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Sadberge Merle" (A N 972)
2nd No. 876 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Sadberge Partridge" (A N 699)

CONFINED TO SCOTTISH EXHIBITORS.

CLASS 121. MALE GOAT, any Variety, one year old and over.—Premiums, £3, £2, and £1, given by the Baroness Burton, Dochfour

1st No. 871 Miss M. E Duff, Earlsneuk, Elie, Fife (Anglo Nubian Swiss), "†Prestige of Bashley" (H B 3291)
2nd No. 873 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Earlsbruk Klito" (A N 947).
3rd No 872 Lady Helen Graham, Buchanan Castle, Drymen, Glasgow (Anglo Nubian-Swiss), "Ciceter Jackanapes" (3128)
H No. 874 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Edenbruk Mathias" (A N 1155).

CLASS 122. FEMALE GOAT, in milk, any age —Premiums, £3, £2, and £1, given by the Baroness Burton, Dochfour

1st No. 877 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo-Nubian), "Sadberge Merle" (A N 972).
2nd No. 876 Mrs Sydney Macdonald, Garrochly, Kingarth, Rothesay, Isle of Bute (Anglo Nubian), "Sadberge Partridge" (A N 699)
3rd No. 888 David Courage, 60 Carden Place, Aberdeen (Appenzel), "Molly.'

PIGS.

LARGE WHITE.

PRESIDENT'S CHAMPION MEDAL for best Large White Pig.

No. 891 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook King XIX." (21,021).

CLASS 123. BOAR, farrowed before 1919.—Premiums, £8, £4, and £2.

1st	No. 891	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook King XIX." (21,021).
2nd	No. 894	Trustees of Alasdair W. M'Robert, Douneside, Tarland, Aberdeenshire, "Hedges Merlin" (24,239).
3rd	No. 895	James Marshall, Mains of Kilmarnock, by Alexandria, "Dalmeny Major."
H	No. 890	Edinburgh Corporation Farm Colony, Farm Colony, Polton, Mid-Lothian, "Springfield King" (22,729).
C	No. 889	Aberdeen Royal Asylum, Cornhill Road, Aberdeen, "Ashgrove President."

CLASS 124. BOAR, farrowed in 1919.—Premiums, £8, £4, and £2.

1st	No. 907	The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Dalmeny Macbeth."
2nd	No. 902	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook King XXIV." (26,295).
3rd	No. 904	James Mackintosh, Rosehill Croft, Aberdeen, "Aberdeen Boy."
H	No. 906	Duncan Phillips, Gladstone Terrace Feus, Stanley, Perthshire, "Ear No. 3."
C	No. 901	J. & C. Frame, Birdsmill, Broxburn, West Lothian, "Birdsmill Banner."

CLASS 125. BOAR, farrowed in 1920.—Premiums, £6, £3, and £1.

1st	No. 912	Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.
2nd	No. 913	Thomas Simpson, Duddingston Farm, Portobello.
3rd	No. 909	Lord Forteviot of Dupplin, Dupplin Castle, Perth, "Dupplin Mendel."
V	No. 914	William D. Telfer, Montrose Stables Farm, Hawthornden, Lasswade, Mid-Lothian.
H	No. 910	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.
C	No. 911	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.

CLASS 126. SOW, farrowed before 1919.—Premiums, £8, £4, and £2.

1st	No. 917	J. & C. Frame, Birdsmill, Broxburn, West Lothian, "Worsley Queen LXXIII." (55,884).
2nd	No. 916	J. & C. Frame, Birdsmill, Broxburn, West Lothian, "Sundon Mary Jane" (50,776).
3rd	No. 923	Thomas Simpson, Duddingston Farm, Portobello, "Walton Albina IV." (55,592).
V	No. 922	The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Dalmeny Mana II." (53,258).
H	No. 918	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Verbena of Mains I." (55,554).
C	No. 915	Aberdeen Royal Asylum, Cornhill Road, Aberdeen, "Ashgrove Molly."

CLASS 127. SOW, farrowed in 1919.—Premiums, £8, £4, and £2.

1st	No. 932	The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Dalmeny Maxie."
2nd	No. 927	J. & C. Frame, Birdsmill, Broxburn, West Lothian, "Mable of Walton X."
3rd	No. 933	The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Dalmeny Meg."
V	No. 929	Wm. Holdsworth Lunn, Corriebruach, Pitlochry, "Bottesford Buttercup XXVIII."
H	No. 934	Thomas Simpson, Duddingston Farm, Portobello, "Duddingston Albina I."
C	No. 931	Duncan Phillips, Gladstone Terrace Feus, Stanley, Perthshire (271).

CLASS 128. SOW, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 940 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.
2nd No. 939 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.
3rd No. 936 Lord Forteviot of Dupplin, Dupplin Castle, Perth, "Dupplin Molly."
V No. 941 Thomas Simpson, Duddingston Farm, Portobello.
H No. 937 D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh.
C No. 942 James Stirling, Mossgrove, Bridge of Allan, "Mossgrove Moss."

MIDDLE WHITE.

PRESIDENT'S CHAMPION MEDAL for best Middle White Pig.

No. 949 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Rosebud of Mid-Lothian" (45,812).

CLASS 129. BOAR, any age.—Premiums, £8, £4, and £2.

1st No. 945 Daniel Reid, Errol Arms Hotel, Errol, Perthshire, "Errol Emperor."
2nd No. 944 Duncan Phillips, Gladstone Terrace Feus, Stanley, Perthshire, "Juniperbank Watchful."

CLASS 130. BOAR, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 946 The Earl of Rosebery and Mid-Lothian, K.G., K.T, Dalmeny House, Edinburgh.
2nd No. 947 S. F. Edge, Gallops Homestead, Ditchling, Sussex, "Albany King Shrewsbury II." (896).

CLASS 131. SOW, any age.—Premiums, £8, £4, and £2.

1st No. 949 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Rosebud of Mid-Lothian" (45,812).
2nd No. 948 Daniel Reid, Errol Arms Hotel, Errol, Perthshire, "Errol Snowflake II."

CLASS 132. SOW, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 951 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.
2nd No. 950 S. F. Edge, Gallops Homestead, Ditchling, Sussex, "Albany Fuchsia XVI." (896).

BERKSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Berkshire Pig.

No. 952 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell Prince" (20,332).

CLASS 133. BOAR, any age.—Premiums, £8, £4, and £2.

1st No. 952 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell Prince" (20,332).
2nd No. 953 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh, "Thorntonhall Kerick" (21,040).

CLASS 134. BOAR, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 954 A. H. Bishop, Home Farm, Thorntonhall, by Glasgow, "Thorntonhall Don."
2nd No. 956 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.
3rd No. 955 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell Pioneer."

CLASS 135. SOW, any age.—Premiums, £8, £4, and £2.

1st No. 958 A. H. Bishop, Home Farm, Thorntonhall, by Glasgow, "Meerbarn B" (22,389.)
2nd No. 960 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell Minnie" (21,907).

CLASS 136. SOW, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 961 A. H. Bishop, Home Farm, Thorntonhall, by Glasgow.
2nd No. 963 W. Howard Palmer, Stokes Farm, Wokingham, Berkshire, "Murrell Patience."
3rd No. 962 A. H. Bishop, Home Farm, Thorntonhall, by Glasgow, "Thorntonhall Chary."
V No. 964 The Earl of Rosebery and Mid-Lothian, K.G., K.T., Dalmeny House, Edinburgh.

LARGE BLACK.

PRESIDENT'S CHAMPION MEDAL for best Large Black Pig.

No. 997 James Adam, Park, Nairn, "Park Sunbeam" (23,880).

CLASS 137. BOAR, any age.—Premiums, £8, £4, and £2.

1st No. 975 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Mannsfield Wonder" (11,143).
2nd No. 973 Councillor E G. Wright, Johnstone Gardens, Aberdeen, "Sudbourne Basil" (11,903).
3rd No. 974 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Prince Jewel" (7839).
H No. 965 James Adam, Park, Nairn, "Park Laird" (8741).
C No. 966 R. M. Christie of Durie, Leven, Fife, "Kibbean Royal Scot" (12,597).

CLASS 138. SOW, any age.—Premiums, £8, £4, and £2.

1st No. 977 James Adam, Park, Nairn, "Park Sunbeam" (23,880).
2nd No. 976 James Adam, Park, Nairn, "Sudbourne Salome" (18,356).
3rd No. 987 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Lulu I." (24,172).
V No. 982 John Edwards, South Kirkhill, Balnagask, Aberdeen, "Kirkhill Mermaid."
H No. 984 Richard Rattray, Parkconon, Arbroath, "Parkconon Duchess."
C No. 988 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Vahan Lulu II." (24,174).

CLASS 139. SOW, farrowed in 1920.—Premiums, £6, £3, and £1.

1st No. 993 Andrew B. Dalgety, Wellton Ardler, Coupar-Angus.
2nd No. 998 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Mannofield Diana II."
3rd No. 991 James Adam, Park, Nairn.
H No. 997 Richard Rattray, Parkconon, Arbroath.
C No. 999 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, "Mannofield Typist II."

EXTRA STOCK.

The following was Very Highly Commended, and a Silver Medal awarded :—

No. 1000 Councillor E. G. Wright, Johnstone Gardens, Aberdeen, 3 Gilts and 3 Boars, farrowed 16th April 1920.

POULTRY.

First Premium—*One Sovereign.* Second Premium—*Ten Shillings.*
Where there are six or more Entries, Third Premium—*Five Shillings.*

Champion Challenge Bowl, value £50, *for the best exhibit in the Poultry Classes*—given by the Proprietors of 'The Scottish Poultry News,' Aberdeen.

No. 63 Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.

CHAMPION MEDALS.

1. *Best Cock, any variety.*

No. 344 Charles Aitkenhead, Carr House Farm, New Seaham.

2. *Best Hen, any variety.*

No. 63 Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.

3. *Best Cockerel, any variety.*

No. 116 William Charles, Gammons, Rothienorman.

4. *Best Pullet, any variety.*

No. 144 David Reid, Firthview, Port Gordon.

5. *Best Pen of Waterfowls.*

No. 491 James Huntly & Son, Hirsel Poultry Farm, Coldstream.

6. *Best Pen of Turkeys.*

No. 544 George F. Barron, Thomastown, Auchterless.

CLASS 1. LEGHORN—White. Cock.

1st	No. 1	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 4	J. Ernest Kerr, Harviestoun Castle, Dollar.
V	No. 3	A. H. Falconer, Ballaggan, Gollanfield Junction.
H	No. 2	Robert Durward, Boot and Shoemaker, Dunecht.

CLASS 2. LEGHORN—White. Hen.

1st	No. 6	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 15	Robert Young, Millburn Cottage, Renton.
3rd	No. 7	Robert Durward, Boot and Shoemaker, Dunecht.
V	No. 8	A. H. Falconer, Ballaggan, Gollanfield Junction.
H	No. 14	James Stirling, Mossgrove, Bridge of Allan.

CLASS 3. LEGHORN—White. Cockerel.

1st	No. 16	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 21	James Stirling, Mossgrove, Bridge of Allan.

CLASS 4. LEGHORN—White. Pullet.

1st	No. 22	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 23	R. & D. Polson, St Clair Place, Seafield Road, Kirkcaldy.

CLASS 5. LEGHORN—Any other Colour. Cock.

1st	No. 25	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks (Brown).
2nd	No. 26	Robert Durward, Boot and Shoemaker, Dunecht (Brown).
3rd	No. 28	James B. Salmond, The Glen, Glencraig (Black).
V	No. 31	W. Woodmass, Howard House Farm, Gilsland (Black).
H	No. 30	John N. Watson, Cawhillan, Ochiltree (Brown).
C	No. 29	William D. Thom, Seton Cottage, Woodside, Aberdeen (Black).

CLASS 6. LEGHORN—Any other Colour. Hen.

1st	No. 33	Robert Durward, Boot and Shoemaker, Dunecht (Brown).
2nd	No. 35	James B. Salmond, The Glen, Glencraig (Black).
3rd	No. 36	James B Salmond, The Glen, Glencraig (Black).
V	No. 38	Williamson Bros., East Lochran, Blairadam (Black).
H	No. 34	Robert M'Millan, Poultry Farm, Witch Road, Kilmarnock (Brown).
C	No. 37	John N. Watson, Cawhillan, Ochiltree (Brown).

CLASS 7. LEGHORN—Any other Colour. Cockerel.

1st	No. 44	James B. Salmond, The Glen, Glencraig (Black).
2nd	No. 45	James B. Salmond, The Glen, Glencraig (Black).
3rd	No. 48	W. Woodmass, Howard House Farm, Gilsland (Black).
V	No. 42	R. Robertson, Ballingry Road, Lochore, Glencraig (Black).
H	No. 47	John N. Watson, Cawhillan, Ochiltree (Brown).
C	No. 40	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Brown).

CLASS 8. LEGHORN—Any other Colour. Pullet.

1st	No. 53	John N. Watson, Cawhillan, Ochiltree (Black).
2nd	No. 52	John N. Watson, Cawhillan, Ochiltree (Black).
3rd	No. 54	W. Woodmass, Howard House Farm, Gilsland (Black).
V	No. 50	R. Robertson, Ballingry Road, Lochore, Glencraig (Black).
H	No. 49	R. Robertson, Ballingry Road, Lochore, Glencraig (Black).
C	No. 51	James B. Salmond, The Glen, Glencraig (Black).

CLASS 9. MINORCA. Cock.

1st	No. 56	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 55	William Binnie, Harviestoun, Dollar.
3rd	No. 59	Ian Sinclair, Fern Cottage, Inverurie.
V	No. 57	Robt. M'Millan, Poultry Farm, Witch Road, Kilmarnock

CLASS 10. MINORCA. Hen.

1st	No. 63	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 62	William Binnie, Harviestoun, Dollar.
3rd	No. 66	Ian Sinclair, Fern Cottage, Inverurie.
V	No. 64	John Harvie, Auchenbegg, Coalburn, Lanarkshire.
H	No. 61	William Binnie, Harviestoun, Dollar.
C	No. 65	William M Milne, 19 High Street, Turriff.

CLASS 11. MINORCA. Cockerel.

1st	No. 68	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 69	Alexander Cruickshank, Milltown, Rothiemay.
V	No. 67	William Binnie, Harviestoun, Dollar.

CLASS 12. MINORCA. Pullet.

1st	No. 73	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
2nd	No. 75	Ian Sinclair, Fern Cottage, Inverurie.
V	No. 72	William Binnie, Harviestoun, Dollar.

CLASS 13. SCOTCH GREY. Cock.

1st	No. 79	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
2nd	No. 76	John Carswell, 148 Graham's Road, Falkirk.
V	No. 77	Mrs M. A. Grant, Westlands, Horley.
H	No. 80	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
C	No. 78	John M. Moubray, Strone House, Strone.

CLASS 14. SCOTCH GREY. Hen.

1st	No. 83	Robt. M'Millan, Poultry Farm, Witch Road, Kilmarnock.
2nd	No. 81	John Carswell, 148 Graham's Road, Falkirk
V	No. 84	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
H	No. 85	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
C	No. 82	Mrs M. A. Grant, Westlands, Horley.

CLASS 15. SCOTCH GREY. Cockerel.

1st	No. 87	John Carswell, 148 Graham's Road, Falkirk.
2nd	No. 88	Mrs M. A. Grant, Westlands, Horley.
V	No. 86	John Carswell, 148 Graham's Road, Falkirk.

CLASS 16. SCOTCH GREY. Pullet.

1st	No. 93	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
2nd	No. 92	Mrs M. A. Grant, Westlands, Horley.
3rd	No. 94	William Ramsay, Muirhouse, Crosshouse, by Kilmarnock.
V	No. 90	John Carswell, 148 Graham's Road, Falkirk.
H	No. 91	John Carswell, 148 Graham's Road, Falkirk.
C	No. 95	Matthew Smith, Netherholm, Kirkmahoe, Dumfries.

CLASS 17. PLYMOUTH ROCK. Barred Cock.

1st	No. 99	Dr E. S. Jackson, Poultry Farm, Carnforth.
2nd	No. 100	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.
3rd	No. 98	William Charles, Gammons, Rothienorman.
V	No. 96	G. Anderson, East Ferryvale, Dunecht.
H	No. 101	James M'Connach, Gordon's Cottage, Tarland.
C	No. 97	Andrew Brownlie, Hillhead Cottage, Strathaven.

CLASS 18. PLYMOUTH ROCK. Barred Hen.

1st	No. 108	Dr E. S. Jackson, Poultry Farm, Carnforth.
2nd	No. 106	William Charles, Gammons, Rothienorman.
3rd	No. 105	Charles Brown, Ivy Bank, Kintore
V	No. 102	David J. C Aird, Mount Charles Poultry Yards, Kilmarnock.
H	No. 112	James M'Connach, Gordon's Cottage, Tarland.
C	No. 110	James Logan, Linton Lodge, East Linton, Prestonkirk.

CLASS 19. PLYMOUTH ROCK. Barred Cockerel.

1st	No. 116	William Charles, Gammons, Rothienorman.
2nd	No. 117	James M'Connach, Gordon's Cottage, Tarland.
V	No. 118	Jack Sutton, Lisbon Cottage, Kettlebridge, Kingskettle.
H	No. 115	G. Anderson, East Ferryvale, Dunecht

CLASS 20. PLYMOUTH ROCK. Barred Pullet.

1st	No. 120	William Charles, Gammons, Rothienorman.
2nd	No. 121	James M'Connach, Gordon's Cottage, Tarland.
V	No. 119	G. Anderson, East Ferryvale, Dunecht.
H	No. 122	Jack Sutton, Lisbon Cottage, Kettlebridge, Kingskettle.

CLASS 21. PLYMOUTH ROCK—Any other Colour. Cock or Cockerel.

1st	No. 123	Dr E. S. Jackson, Poultry Farm, Carnforth (Buff).
2nd	No. 124	Herbert Spensley, Oakes Farm, Menston, *viâ* Leeds (Buff).

CLASS 22. PLYMOUTH ROCK—Any other Colour. Hen or Pullet.

1st	No. 125	Dr E. S. Jackson, Poultry Farm, Carnforth (Buff).

CLASS 23. ORPINGTON—Black. Cock.

1st	No. 134	C. E. Woodward, Clipstone Colliery, Edwinstowe, near Newark.
2nd	No. 131	Dr E. S. Jackson, Poultry Farm, Carnforth.
3rd	No. 132	David Reid, Firthview, Portgordon.
V	No. 133	David Reid, Firthview, Portgordon.
H	No. 129	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
C	No. 130	William Chrystal, Inverboyndie, Banff.

CLASS 24. ORPINGTON—Black. Hen.

1st	No. 140	C. E. Woodward, Clipstone Colliery, Edwinstowe, near Newark.
2nd	No. 139	David Reid, Firthview, Portgordon.
V	No. 137	Dr E. S. Jackson, Poultry Farm, Carnforth.
C	No. 138	David Reid, Firthview, Portgordon.

CLASS 25. ORPINGTON—Black. Cockerel.

1st	No. 142	David Reid, Firthview, Portgordon.

CLASS 26. ORPINGTON—Black. Pullet.

1st	No. 144	David Reid, Firthview, Portgordon.
2nd	No. 145	David Reid, Firthview, Portgordon.

CLASS 27. ORPINGTON—Buff. Cock.

1st	No. 148	David Reid, Firthview, Portgordon.
2nd	No. 151	William Reid & Son, Hallcraig House, Airdrie.
3rd	No. 150	Mrs Reid, Frogmore, Newburgh, Aberdeenshire.
V	No. 149	David Reid, Firthview, Portgordon.
C	No. 147	James Huntly & Son, Hirsel Poultry Farm, Coldstream.

CLASS 28. ORPINGTON—Buff. Hen.

1st	No. 154	David Reid, Firthview, Portgordon.
2nd	No. 153	David Reid, Firthview, Portgordon.
V	No. 155	William D. Thom, Seton Cottage, Woodside, Aberdeen.
H	No. 152	A. H. Falconer, Ballagan, Gollanfield Junction.

CLASS 29. ORPINGTON—Buff. Cockerel.

1st	No. 156	William Charles Gammons, Rothienorman.
2nd	No. 157	David Reid, Firthview, Portgordon.
V	No. 160	William Reid & Son, Hallcraig House, Airdrie.

CLASS 30. ORPINGTON—Buff. Pullet.

1st	No. 165	David Reid, Firthview, Portgordon.
2nd	No. 164	David Reid, Firthview, Portgordon.
V	No. 166	William Reid & Son, Hallcraig House, Airdrie.
H	No. 163	William Charles, Gammons, Rothienorman.

CLASS 31. ORPINGTON—White. Cock.

1st	No. 168	Marchioness of Tweeddale, Yester, Gifford.

Class 32. ORPINGTON—White. Hen.

1st	No. 170	Marchioness of Tweeddale, Yester, Gifford.
2nd	No. 169	William Reid & Son, Hallcraig House, Airdrie.
V	No. 171	Marchioness of Tweeddale, Yester, Gifford.

Class 33. ORPINGTON—White. Cockerel.

1st	No. 172	Charles Gatherer, 29 Princes Street, Huntly.

Class 34. ORPINGTON—White. Pullet.

(*Not Forward.*)

Class 35. WYANDOTTE—Gold or Silver. Cock.

1st	No. 175	Clifford Calvert, Eastwood Mills, Keighley.
2nd	No. 174	Clifford Calvert, Eastwood Mills, Keighley.
3rd	No. 178	J. W. Smith, St Leonard Street, Lanark.
V	No. 179	J. W. Smith, St Leonard Street, Lanark.
H	No. 177	Robert Mitchell, Kennoway Road, Windygates.

Class 36. WYANDOTTE—Gold or Silver. Hen.

1st	No. 180	Clifford Calvert, Eastwood Mills, Keighley.
2nd	No. 185	Herbert Spensley, Oaks Farm, Menston, *vià* Leeds.
3rd	No. 181	Clifford Calvert, Eastwood Mills, Keighley.
V	No. 183	Robert Mitchell, Kennoway Road, Windygates.
H	No. 186	Andrew C. Turner, Church Street, Ladybank.
C	No. 182	John Chrystal, Inverboyndie, Banff.

Class 37. WYANDOTTE—Gold or Silver. Cockerel.

1st	No. 187	Clifford Calvert, Eastwood Mills, Keighley.
2nd	No. 189	William Richardson, 13 Bootham Crescent, York.
V	No. 188	Robert Mitchell. Kennoway Road, Windygates.

Class 38. WYANDOTTE—Gold or Silver. Pullet.

1st	No. 190	Clifford Calvert, Eastwood Mills, Keighley.
2nd	No. 192	William Richardson, 13 Bootham Crescent, York.

Class 39. WYANDOTTE—White. Cock.

1st	No. 193	John M. Aberdein, Glass, Huntly.
2nd	No. 196	J. Ernest Kerr, Harviestoun Castle, Dollar.
3rd	No. 195	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
V	No. 200	David Reid, Firthview, Portgordon.
H	No. 197	J. Ernest Kerr, Harviestoun Castle, Dollar.

Class 40. WYANDOTTE—White. Hen.

1st	No. 204	J. Ernest Kerr, Harviestoun Castle, Dollar.
2nd	No. 202	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
3rd	No. 205	J. Ernest Kerr, Harviestoun Castle, Dollar.
V	No. 201	G. Anderson, East Ferryvale, Dunecht.
H	No. 207	Miss M'Nab, Middleton Kerse, Menstrie.

Class 41. WYANDOTTE—White. Cockerel.

1st	No. 211	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks
2nd	No. 216	J. Ernest Kerr, Harviestoun Castle, Dollar.
3rd	No. 220	David Reid, Firthview, Portgordon.
V	No. 210	G. Anderson, East Ferryvale, Dunecht.
H	No. 215	Dr E. S. Jackson, Poultry Farm, Carnforth.
C	No. 218	Lady Emily Frances Nairn, Rankeilour Mains, Springfield, Fife.

Class 42. WYANDOTTE—White. Pullet.

1st	No. 228	J. Ernest Kerr, Harviestoun Castle, Dollar.
2nd	No. 223	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks.
3rd	No. 231	David Reid, Firthview, Portgordon.
H	No. 225	William Charles, Gammons, Rothienorman.
C	No. 234	James Stirling, Mossgrove, Bridge of Allan.
C	No. 232	David Reid, Firthview, Portgordon.

Class 43. WYANDOTTE—Partridge. Cock or Cockerel.

1st	No. 235	Robert Niven & Son, Abbey Poultry Yards, Newmills.
2nd	No. 236	Robert Niven & Son, Abbey Poultry Yards, Newmills.

Class 44. WYANDOTTE—Partridge. Hen or Pullet.

1st	No. 238	J. A. Boardloy, Slyne Road, Lancaster.
2nd	No. 239	Alexander Dingwall, Braigiewell, Skene.

Class 45. WYANDOTTE—Any other Colour. Cock or Cockerel.

1st	No. 241	William Lear, Howard Cottage, Wetheral, Carlisle (Buff).

Class 46. WYANDOTTE—Any other Colour. Hen or Pullet.

1st	No. 245	Robert Niven & Son, Abbey Poultry Yards, Newmills (Black).
2nd	No. 244	James Logan, Linton Lodge, East Linton, Prestonkirk (Black)
V	No. 243	James Logan, Linton Lodge, East Linton, Prestonkirk (Black).
H	No. 242	William Lear, Howard Cottage, Wetheral, Carlisle (Buff).

Class 47. RHODE ISLAND RED. Cock.

1st	No. 248	Charles Brown, Ivy Bank, Kintore.
2nd	No. 254	Thomas Shanks, 10 Mill Road, Bathgate.
3rd	No. 247	Alexander Bisset, Knowe Head, Freuchie.
V	No. 250	James Mason, 8 Starbank Road, Leith.
H	No. 249	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
H	No. 253	John Robertson, Craigend, Dundas, South Queensferry.
C	No. 256	James Stirling, Mossgrove, Bridge of Allan.

Class 48. RHODE ISLAND RED. Hen.

1st	No. 257	E. F. Bauer, Wheatfield, Craigentinny, Edinburgh.
2nd	No. 259	James Mason, 8 Starbank Road, Leith.
3rd	No. 260	William Morgan, Balcurvie, Windygates.
V	No. 264	James Stirling, Mossgrove, Bridge of Allan.
H	No. 265	Jack Sutton, Lisbon Cottage, Kettlebridge, Kingskettle.
C	No. 261	Thomas Shanks, 10 Mill Road, Bathgate.

Class 49. RHODE ISLAND RED. Cockerel.

1st	No. 267	John Robertson, Craigend, Dundas, South Queensferry.
2nd	No. 272	John H. White, Hawthorns Lodge, Galashiels.
3rd	No 269	James Stirling, Mossgrove, Bridge of Allan.
V	No. 271	John H. White, Hawthorns Lodge, Galashiels.
H	No. 266	James Mason, 8 Starbank Road, Leith.
C	No. 270	James Stirling, Mossgrove, Bridge of Allan.

Class 50. RHODE ISLAND RED. Pullet.

1st	No. 276	John Robertson, Craigend, Dundas, South Queensferry.
2nd	No. 273	Dr E. S. Jackson, Poultry Farm, Carnforth.
3rd	No. 275	John Robertson, Craigend, Dundas, South Queensferry.
V	No. 274	James Mason, 8 Starbank Road, Leith.
H	No. 278	W. B. T. Smith, 158 Croft Street, Galashiels.
H	No. 282	John H. White, Hawthorns Lodge, Galashiels.
C	No. 279	Alexander Stewart, Hotel, Balbeggie, Perth.

Class 51. FAVEROLLES. Cock.

(*No Entry.*)

Class 52. FAVEROLLES. Hen.

(*No Entry.*)

Class 53. FAVEROLLES. Cockerel.

(*No Entry.*)

Class 54. FAVEROLLES. Pullet.

(*No Entry.*)

Class 55. SUSSEX—Light. Cock.

1st	No. 285	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
2nd	No. 291	Marchioness of Tweeddale, Yester, Gifford.
3rd	No. 287	William Reid & Son, Hallcraig House, Airdrie.
V	No. 290	James Stirling, Mossgrove, Bridge of Allan.
H	No. 289	James Stirling, Mossgrove, Bridge of Allan.
C	No. 288	Joseph G. Scott, Congalton, Drem.

Class 56. SUSSEX—Light. Hen.

1st	No. 302	Marchioness of Tweeddale, Yester, Gifford.
2nd	No. 298	William Reid & Son, Hallcraig House, Airdrie.
3rd	No. 300	James Stirling, Mossgrove, Bridge of Allan.
V	No. 296	Mrs M. A. Grant, Westlands, Horley.
H	No. 294	William Chrystal, Inverboyndie, Banff.
C	No. 299	Joseph G. Scott, Congalton, Drem.

Class 57. SUSSEX—Light. Cockerel.

1st	No. 304	Miss Edith Baird, Colstoun, Haddington.
2nd	No. 307	Dr E. S. Jackson, Poultry Farm, Carnforth.
3rd	No. 311	James Stirling, Mossgrove, Bridge of Allan.
V	No. 306	Mrs M. A. Grant, Westlands, Horley.
H	No. 305	William Charles, Gammons, Rothienorman.
C	No. 309	William Reid & Son, Hallcraig House, Airdrie.

Class 58. SUSSEX—Light. Pullet.

1st	No. 316	Mrs M. A. Grant, Westlands, Horley.
2nd	No. 312	Miss Edith Baird, Colstoun, Haddington.
3rd	No. 313	Miss Edith Baird, Colstoun, Haddington.
V	No. 315	William Charles, Gammons, Rothienorman.
H	No. 318	William Reid & Son, Hallcraig House, Airdrie.
C	No. 319	Joseph G. Scott, Congalton, Drem.

Class 59. SUSSEX—Any other Variety. Cock.

1st	No. 325	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).
2nd	No. 322	Mrs M. A. Grant, Westlands, Horley (Red).
3rd	No. 323	Mrs M. A Grant, Westlands, Horley (Speckled).
V	No. 324	Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
H	No. 326	William Reid & Son, Hallcraig House, Airdrie.

Class 60. SUSSEX—Any other Variety. Hen.

1st	No. 329	Mrs M. A. Grant, Westlands, Horley (Speckled).
2nd	No. 328	Mrs M. A. Grant, Westlands, Horley (Red).
3rd	No. 331	Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
V	No. 327	G. Anderson, East Ferrydale, Dunecht.
H	No. 332	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyn (Speckled).
C	No. 330	David Hain, High Street, Frenchie (Speckled).

Class 61. SUSSEX—Any other Variety. Cockerel.

1st	No. 334	Mrs M. A. Grant, Westlands, Horley (Red).
2nd	No. 335	Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
V	No. 333	G. Anderson, East Ferryvale, Dunecht.
H	No. 337	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.

Class 62. SUSSEX—Any other Variety. Pullet.

1st	No. 341	Dr E. S. Jackson, Poultry Farm, Carnforth (Speckled).
2nd	No. 338	G. Anderson, East Ferryvale, Dunecht.
V	No. 339	Mrs M. A. Grant, Westlands, Horley (Red).
H	No. 340	Mrs M. A. Grant, Westlands, Horley (Speckled).
C	No. 342	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne (Speckled).

Class 63. DORKING—Coloured. Cock.

1st	No. 344	Charles Aitkenhead, Carr House Farm, New Seaham.
2nd	No. 345	John Mechie, Grain Merchant, Auchtermuchty.

Class 64. DORKING—Coloured. Hen.

1st	No. 346	Charles Aitkenhead, Carr House Farm, New Seaham.
2nd	No. 347	John Mechie, Grain Merchant, Auchtermuchty.

Class 65. DORKING—Coloured. Cockerel.

1st	No. 350	James Rogers, Forneth, Blairgowrie.
2nd	No. 349	Charles Aitkenhead, Carr House Farm, New Seaham.

Class 66. DORKING—Coloured. Pullet.

1st	No. 351	Charles Aitkenhead, Carr House Farm, New Seaham.
2nd	No. 352	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
V	No. 353	James Rogers, Forneth, Blairgowrie.

Class 67. DORKING—Silver Grey. Cock.

1st	No. 354	Charles Aitkenhead, Carr House Farm, New Seaham.
2nd	No. 361	James Rodger, Forneth, Blairgowrie.
3rd	No. 360	John Mechie, Grain Merchant, Auchtermuchty.
V	No. 356	Thomas Davidson, The Kennels, Drummuir, Keith.
H	No. 357	Alexander Low, Gamekeeper's Cottage, Drumoak.
H	No. 363	Marchioness of Tweeddale, Yester, Gifford.

Class 68. DORKING—Silver Grey. Hen.

1st	No. 368	John Mechie, Grain Merchant, Auchtermuchty.
2nd	No. 364	Thomas Davidson, The Kennels, Drummuir, Keith.
3rd	No. 369	James Rogers, Forneth, Blairgowrie.
V	No. 366	William Mackie, 139 Land Street, Keith.
H	No. 370	James K. Ross, North Buthill, Roseisle, Burghead.
C	No. 365	Thomas Davidson, The Kennels, Drummuir, Keith.
C	No. 371	Marchioness of Tweeddale, Yester, Gifford.

Class 69. DORKING—Silver Grey. Cockerel.

1st	No. 372	Charles Aitkenhead, Carr House Farm, New Seaham.
2nd	No. 375	John Mechie, Grain Merchant, Auchtermuchty.
3rd	No. 377	James K. Ross, North Buthill, Roseisle, Burghead.
H	No. 374	Alexander Low, Gamekeeper's Cottage, Drumoak.
C	No. 378	Marchioness of Tweeddale, Yester, Gifford.
C	No. 373	Thomas Davidson, The Kennels, Drummuir, Keith.

Class 70. DORKING—Silver Grey. Pullet.

1st	No. 382	John Mechie, Grain Merchant, Auchtermuchty.
2nd	No. 379	Charles Aitkenhead, Carr House Farm, New Seaham.
3rd	No. 381	Alexander Low, Gamekeeper's Cottage, Drumoak.
V	No. 384	James K. Ross, North Buthill, Roseisle Burghead.

Class 71. SCOTS DUMPY. Cock or Cockerel.

1st	No. 385	J. Ernest Kerr, Harviestoun Castle, Dollar.
2nd	No. 386	J. Ernest Kerr, Harviestoun Castle, Dollar.
3rd	No. 387	John Major, Ditton, Langley, Bucks.
V	No. 388	John Major, Ditton, Langley, Bucks.
H	No. 389	A. S. Paxton, Calderduns, Airdrie.
C	No. 391	William Reid & Son, Hallcraig House, Airdrie.

Class 72. SCOTS DUMPY. Hen or Pullet.

1st	No. 392	J. Ernest Kerr, Harviestoun Castle, Dollar.
2nd	No. 393	J. Ernest Kerr, Harviestoun Castle, Dollar.
3rd	No. 394	John Major, Ditton, Langley, Bucks.
V	No. 397	William Reid & Son, Hallcraig House, Airdrie.
H	No. 395	John Major, Ditton, Langley, Bucks.
C	No. 399	Alexander Stewart, Hotel, Balbeggie, Perth.

Class 73. INDIAN GAME. Cock.

1st	No. 401	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
2nd	No. 403	J. Ernest Kerr, Harviestoun Castle, Dollar.
V	No. 400	E. F. Bauer, Wheatfield, Craigentinny, Edinburgh.
H	No. 402	William A. B. Black, Croftfoot, Old Polmont.

Class 74. INDIAN GAME. Hen.

1st	No. 408	J. Ernest Kerr, Harviestoun Castle, Dollar.
2nd	No. 405	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
3rd	No. 407	Francis J. B. Douglas, Redlairdston, Buchlyvie.
V	No. 406	William A. B. Black, Croftfoot, Old Polmont.
H	No. 404	E. F. Bauer, Wheatfield, Craigentinny, Edinburgh.
C	No. 409	B. Wilkinson, Towngate, Hipperholme, near Halifax.

Class 75. INDIAN GAME. Cockerel.

1st	No. 411	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
2nd	No. 410	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock
C	No. 413	J. Ernest Kerr, Harviestoun Castle, Dollar.

Class 76. INDIAN GAME. Pullet.

1st	No. 414	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
2nd	No. 416	J. Ernest Kerr, Harviestoun Castle, Dollar.

Class 77. GAME—Old English. Cock.

1st	No. 420	John T. Dodd, Riccarton, Newcastleton.
2nd	No. 417	James Bonthrone, Pitcairn, Cardenden.
V	No. 421	John Hutt, Denend, Cardenden.
H	No. 419	Mrs Allan Cameron, Dores, Inverness.
C	No. 418	James Bonthrone, Pitcairn, Cardenden.

Class 78. GAME—Old English. Hen.

1st	No. 424	David Hain, High Street, Freuchie.
2nd	No. 422	James Bonthrone, Pitcairn, Cardenden.
V	No. 425	John Hutt, Denend, Cardenden.

Class 79. GAME—Old English. Cockerel.

1st	No. 426	John Hutt, Denend, Cardenden.
2nd	No. 427	William G. Reed, Low Cote Hill Farm, Carlisle.

Class 80. GAME—Old English. Pullet.

1st	No. 428	John Hutt, Denend, Cardenden.
2nd	No. 429	William G. Reed, Low Cote Hill Farm, Carlisle

CLASS 81. BANTAM—Game. Cock.

1st	No. 430	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
2nd	No. 432	A. R. Fish, Holme Mead, Hutton, Preston.
V	No. 434	William Reid & Son, Hallcraig House, Airdrie.

CLASS 82. BANTAM—Game. Hen.

1st	No. 437	A. R. Fish, Holme Mead, Hutton, Preston.
2nd	No. 435	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
H	No. 439	William Reid & Son, Hallcraig House, Airdrie.

CLASS 83. BANTAM—Other than Game. Cock.

1st	No. 442	A. R. Fish, Holme Mead, Hutton, Preston (Sebright).
2nd	No. 431	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
3rd	No. 445	Marchioness of Tweeddale, Yester, Gifford (Pekin).
V	No 443	William Reid & Son, Hallcraig House, Airdrie.
C	No. 440	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.

CLASS 84. BANTAM—Other than Game. Hen.

1st	No. 450	A. R. Fish, Holme Mead, Hutton, Preston (Sebright).
2nd	No. 447	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock.
3rd	No. 436	Alfred Birch, Edge Farm, Sefton, *viâ* Seaforth.
V	No. 451	William Reid & Son, Hallcraig House, Airdrie (Wyandotte).
H	No. 452	Marchioness of Tweeddale, Yester, Gifford (Pekin).
C	No. 453	W. S. Westcott, Castle View, The Abbey, by Stirling (Indian).

CLASS 85. ANY OTHER RECOGNISED BREED. Cock.

1st	No. 455	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks (Hamburgh).
2nd	No. 460	B. Wilkinson, Towngate, Hipperholme, near Halifax (Langshan).
3rd	No. 454	Mrs John Bisset, 61 Skene Square, Aberdeen (Light Brahma).
V	No. 457	William Reid & Son, Hallcraig House, Airdrie (Orpington).
H	No. 458	Ian Sinclair, Fern Cottage, Inverurie (Light Brahma).
C	No. 459	John Sutherland, Rosebery Terrace, Wick (Mahogany Russian Orloff).

CLASS 86. ANY OTHER RECOGNISED BREED. Hen.

1st	No. 463	William Reid & Son, Hallcraig House, Airdrie (Orpington).
2nd	No. 462	Walter Bradley, Homelea Poultry Farm, Silsden, Yorks (Hamburgh).
H	No. 465	John Sutherland, Rosebery Terrace, Wick (Mahogany Russian Orloff).
C	No. 461	Mrs John Bisset, 61 Skene Square, Aberdeen (Light Brahma).
C	No. 464	Ian Sinclair, Fern Cottage, Inverurie (Light Brahma).

CLASS 87. ANY OTHER RECOGNISED BREED. Cockerel.

1st	No. 467	A. R. Fish, Holme Mead, Hutton, Preston (Modern Game).
2nd	No. 466	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Modern Game).
V	No. 468	Lady Emily Frances Nairn, Rankeilour Mains, Springfield, Fife (La Bresse).
C	No. 470	W. Woodmass, Howard House Farm, Gilsland (Orpington).

CLASS 88. ANY OTHER RECOGNISED BREED. Pullet.

1st	No. 472	A. R. Fish, Holme Mead, Hutton, Preston (Sebright).
2nd	No. 471	David J. C. Aird, Mount Charles Poultry Yards, Kilmarnock (Modern Game).
V	No. 475	W. Woodmass, Howard House Farm, Gilsland (Orpington).
H	No. 474	Ian Sinclair, Fern Cottage, Inverurie (Light Brahma).
C	No. 473	Lady Emily Frances Nairn, Rankeilour Mains, Springfield, Fife (La Bresse).

Class 89. CROSS-BRED FOWLS FOR LAYING PURPOSES. Hen.

1st	No. 483	Marchioness of Tweeddale, Yester, Gifford.
2nd	No. 482	J. W. Smith, St Leonard Street, Lanark.
3rd	No. 479	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
V	No. 478	David C. Gauldie, 45 Dishland Street, Arbroath.
H	No. 477	James P. Dalgleish, West Grange, Dunfermline.
C	No. 481	James Mason, 8 Starbank Road, Leith.

Class 90. CROSS-BRED FOWLS FOR LAYING PURPOSES. Pullet.

1st	No. 485	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.
2nd	No. 484	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
3rd	No. 487	William Morgan, Balcurvie, Windygates.
V	No. 488	Lady Emily Frances Nairn, Rankeilour Mains, Springfield, Fife.
C	No. 489	W. Woodmass, Howard House Farm, Gilsland.
C	No. 486	James Mason, 8 Starbank Road, Leith.

Class 91. DUCKS—Aylesbury. Drake.

1st	No. 491	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
2nd	No. 492	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
V	No. 490	William Charles, Gammons, Rothienorman.
H	No. 493	W. R. Mitchell, Ettrick Bridge, Selkirk.

Class 92. DUCKS—Aylesbury. Duck.

1st	No. 497	James Huntly & Son, Hirsel Poultry Farm, Coldstream
2nd	No. 498	James Huntly & Son, Hirsel Poultry Farm, Coldstream
3rd	No. 496	James Durno, Rothiebrisbane, Fyvie.
V	No. 495	James Durno, Rothiebrisbane, Fyvie.
H	No. 499	W. R Mitchell, Ettrick Bridge, Selkirk.
C	No. 494	William Charles, Gammons, Rothienorman.

Class 93. DUCKS—Orpington. Drake.

1st	No 501	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
2nd	No. 502	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
V	No 500	George F. Barron, Thomastown, Auchterless.

Class 94. DUCKS—Orpington. Duck.

1st	No. 504	James Huntly & Son, Hirsel Poultry Farm, Coldstream
2nd	No. 505	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
V	No. 503	George F. Barron, Thomastown, Auchterless.

Class 95. DUCKS—Indian Runner. Drake.

1st	No. 506	Alexander Dingwall, Braigiewell, Skene.
2nd	No. 509	William F. Grant, Corncattrach, Gartly.
3rd	No. 512	James Keay, Kincairney, Murthly.
V	No. 511	James Keay, Kincairney, Murthly.
H	No. 514	Matthew Smith, Netherholm, Kirkmahoe, Dumfries.

Class 96. DUCKS—Indian Runner. Duck.

1st	No. 522	William F. Grant, Corncattrach, Gartly.
2nd	No. 524	William F. Grant, Corncattrach, Gartly.
3rd	No. 528	Matthew Smith, Netherholm, Kirkmahoe, Dumfries.
V	No. 523	William F. Grant, Corncattrach, Gartly.
H	No. 525	James Keay, Kincairney, Murthly.
C	No. 526	James Keay, Kincairney, Murthly.

Class 97. DUCKS—Any other Variety. Drake.

1st	No. 535	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Rouen)
2nd	No. 534	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Rouen).
V	No. 536	Mrs Johnstone, Drumwhindle Mains, Ellon (Rouen).

CLASS 98. DUCKS—Any other Variety. Duck.

1st	No. 537	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Rouen).
2nd	No. 538	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Rouen).
V	No. 539	Mrs Johnstone, Drumwhindle Mains, Ellon (Rouen).

CLASS 99. GEESE. Gander.

1st	No. 540	A. H. Fox-Brockbank, The Croft, Kirksanton, Silecroft.

CLASS 100. GEESE. Goose.

1st	No. 543	A. H. Fox-Brockbank, The Croft, Kirksanton, Silecroft.
2nd	No. 541	G. Anderson, East Ferryvale, Dunecht.
V	No. 542	Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.

CLASS 101. TURKEYS. Cock.

1st	No. 544	George F. Barron, Thomastown, Auchterless.
2nd	No. 545	George F. Barron, Thomastown, Auchterless.
3rd	No. 550	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
V	No. 547	William F. Grant, Corncattrach, Gartly.
H	No. 548	William F. Grant, Corncattrach, Gartly.
C	No. 551	Robt. M'Millan, Poultry Farm, Witch Road, Kilmarnock.

CLASS 102. TURKEYS. Hen.

1st	No. 555	George F. Barron, Thomastown, Auchterless.
2nd	No. 560	James Huntly & Son, Hirsel Poultry Farm, Coldstream.
3rd	No. 554	George F. Barron, Thomastown, Auchterless.
V	No. 556	Colonel G. J. Fergusson-Buchanan of Auchentorlie, Bowling.
H	No. 561	Marchioness of Tweeddale, Yester, Gifford.

TABLE POULTRY.

CLASS 103. TABLE FOWLS—Any Pure Breed. Pair of Cockerels.

1st	No. 563	Miss Edith Baird, Colstoun, Haddington.
2nd	No. 567	Alexander Muil, Northfield, Rothiemay (Light Sussex).
3rd	No. 566	John Mechie, Grain Merchant, Auchtermuchty (Dorking).
H	No. 564	James P. Dalgleish, West Grange, Dunfermline (Plymouth Rock).

CLASS 104. TABLE FOWLS—Any Pure Breed. Pair of Pullets.

1st	No. 573	Alexander Muil, Northfield, Rothiemay (Light Sussex).
2nd	No. 572	John Mechie, Grain Merchant, Auchtermuchty (Dorking).
3rd	No. 571	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Buff Orpington).
H	No. 570	James P. Dalgleish, West Grange, Dunfermline (Plymouth Rock).

CLASS 105. TABLE FOWLS—Game-Cross. Pair of Cockerels.

1st	No. 577	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.

CLASS 106. TABLE FOWLS—Game-Cross. Pair of Pullets.

1st	No. 581	Sir James Knott, Bart., Close House Home Farm, Wylam-on-Tyne.

CLASS 107. TABLE FOWLS—Any other Cross. Pair of Cockerels.

1st	No. 584	G. Anderson, East Ferryvale, Dunecht (Rock Wyandotte Cross).
2nd	No. 585	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Wyandotte Cross).
H	No. 588	W. Woodmass, Howard House Farm, Gilsland (Sussex).

CLASS 108. TABLE FOWLS—Any other Cross. Pair of Pullets.

1st	No. 589	G. Anderson, East Ferryvale, Dunecht.

CLASS 109. DUCKLINGS for Table Purposes—Any Breed or Cross. Pair of Ducklings.

1st	No. 595	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Aylesbury).
2nd	No. 594	James Huntly & Son, Hirsel Poultry Farm, Coldstream (Aylesbury).
V	No. 593	William Charles, Gammons, Rothienorman.
H	No. 597	W. Woodmass, Howard House Farm, Gilsland (Indian Runner).

DAIRY PRODUCE.

CLASS 1. POWDERED BUTTER, not less than 7 lb.—Premiums, £4, £2, and £1.

1st	No. 4	Andrew Fleming, Threepland, Eaglesham.
2nd	No. 8	Miss Elizabeth Rennie, Parkhead, Slamannan.
3rd	No. 9	Miss Shanks, Broomhill, Denny.

CLASS 2. FRESH BUTTER, Three 1-lb. Rolls.—Premiums, £4, £2, and £1.

1st	No. 16	Andrew Fleming, Threepland, Eaglesham.
2nd	No. 23	Miss Elizabeth Rennie, Parkhead, Slamannan.
3rd	No. 24	Miss Shanks, Broomhill, Denny.
V	No. 21	Mrs David Murray, Borrowfield, Netherley, Stonehaven.

CLASS 3. CHEDDAR CHEESE, 56 lb. and upwards.—Premiums, £6, £4, £2, and £1.

1st	No. 36	Alexander Wyllie, Mossgeil, Mauchline.
2nd	No. 27	Alexander Cross, Knockdon, Maybole.
3rd	No. 29	William Hunter, Garthland Mains, Stranraer.
4th	No. 30	Thomas Logan, Low Milton, Maybole.
V	No. 26	Robert Bryan, Orchardton, Cumnock.

CLASS 4. SWEET-MILK CHEESE, flat shape (from a dairy where all cheese is made flat shape), white in colour, made according to the Dunlop or other method. —Premiums, £4, £2, and £1.

1st	No. 37	Hector Galbraith, Polliwilline, Campbeltown.

CLASS 5. CHEESE, 14 lb. and under.—Premiums, £3, £2, and £1.

1st	No. 45	Alexander Wyllie, Mossgiel, Mauchline.
2nd	No. 39	Alexander Cross, Knockdon, Maybole.
3rd	No. 42	Thomas Logan, Low Milton, Maybole.
V	No. 41	William Hunter, Garthland Mains, Stranraer.

BEE APPLIANCES AND HONEY, &c.

OPEN CLASSES.

APPLIANCES.

CLASS 1. Collection of HIVES and APPLIANCES, to include amongst other articles the following: Three Standard Frame Hives complete, fitted with arrangements for supering. A suitable outfit for a beginner in Bee-keeping.—Premiums, 80s., 40s., 20s.

1st	No. 3	R. Steele & Brodie, Wormit Works, Wormit, Fife.
2nd	No. 1	Lindsay & Fenwick, 143 South Street, Perth.
3rd	No. 2	James Robertson, 14 Hadden Street, Aberdeen.

CLASS 2. Best and most complete STANDARD FRAME HIVE for general use, unpainted.—Premiums, 20s., 15s., 10s.

1st	No. 6	R. Steele & Brodie, Wormit Works, Wormit, Fife.
2nd	No. 4	Lindsay & Fenwick, 143 South Street, Perth.
3rd	No. 5	James Robertson, 14 Hadden Street, Aberdeen.

CLASS 4. CHEVIOT WOOL—EWE. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 12	James Henderson, Wiltonburn, Hawick.
2nd	No. 13	Messrs Shiell, Sourhope, Kelso.
3rd	No. 14	The Duke of Sutherland, Dunrobin Home Farm, Golspie.

CLASS 5. CHEVIOT WOOL—HOGG. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 15	James Henderson, Wiltonburn, Hawick.
2nd	No. 16	Messrs Shiell, Sourhope, Kelso.
3rd	No. 17	The Duke of Sutherland, Dunrobin Home Farm, Golspie.

CLASS 6. BORDER LEICESTER WOOL—EWE. Three Fleeces.—Premiums, £3, £2, and £1.

(*No Entry.*)

CLASS 7. BORDER LEICESTER WOOL—HOGG. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 18.	R. G. Murray & Son, Spittal, Biggar.

CLASS 8. HALF-BRED WOOL—EWE. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 19	John C. Brown, Hundalee, Jedburgh.

CLASS 9. HALF-BRED WOOL—HOGG. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 20	John C. Brown, Hundalee, Jedburgh.

CLASS 10. SHETLAND WOOL—EWE. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 25	James Goodlad, Sweenister, Gott, Tingwall.
2nd	No. 26	James Goodlad, Sweenister, Gott, Tingwall.
3rd	No. 27	James Goodlad, Sweenister, Gott, Tingwall.
H	No. 29	Laurence G. Johnston, Setter, Mid Yell, Shetland.
C	No. 21	Thomas A. Anderson, Vementry, Aith, Shetland.
C	No. 22	Dr James C. Bowie, Park Hall, Bixter, Shetland.

CLASS 11. SHETLAND WOOL—HOGG. Three Fleeces.—Premiums, £3, £2, and £1.

1st	No. 35	James Goodlad, Sweenister, Gott, Tingwall.
2nd	No. 30	Thomas A. Anderson, Vementry, Aith, Shetland.
3rd	No. 34	James Goodlad, Sweenister, Gott, Tingwall.
H	No. 36	Laurence G. Johnston, Setter, Mid Yell, Shetland.

NEW IMPLEMENTS.

A Large Silver Medal was awarded to each of the following:—

G. Llewellin & Son, Dairy Engineers, Haverfordwest.

Llewellin's "Victory" Eccentric End-over Churn.

J. Simpson & Sons, Station Road, Otley, Yorkshire.

The Farmers' Friend Cheese Mould and Press.

South Lincolnshire Agricultural Engineering Co. (Land Drainage Excavator Co., Ltd.), Westlode Street, Spalding.

"Revolt" Drain Excavator.

JUDGES

Shorthorn.—John Gill, Thorn Farm, Stainton, Penrith; J. T. M'Laren, The Leuchold, Dalmeny.

Aberdeen-Angus and Fat Cattle.—J. J. Cridlan, Maisemore, Gloucester; D. M. Allan, Ballintomb, Grantown-on-Spey.

Galloway.—W. M'Conchie, Mains of Penninghame, Newton-Stewart; John Rutherford, Allensteads, Low Row, Carlisle.

Highland.—Peter M'Intyre, Tighnablair, Comrie; J. R. Campbell, Glencassley, Rosehall, Invershin, Sutherland.

Ayrshire.—Thomas Barr, Hobsland, Monkton; James Wallace, Chapelhill, Kirkcudbright.

Shetland Cattle.—John Drysdale, 5 St Andrew Square, Edinburgh.

British Friesian.—A. H. Mackie, Hatton Farm, Kinnoull, Perth.

Draught Stallions, Entire Colts, and Geldings.—George Alston. Loudon Hill, Darvel; James Weir, Sandilands, Lanark; George A. Anderson, Comisty, Huntly.

Draught Mares and Fillies.—John Johnston, Carbrookmains Farm, Larbert; James Fleming, Easter Coul, Auchterarder; George M'Dowall, South Boreland, Glenluce.

Hunters.—James J. Paterson, Terrona, Langholm.

Hackneys, Ponies, and Harness Horses.—Alfred Rowell, West Rudham Hall, King's Lynn, Norfolk.

Highland Ponies.—Major William Logan, O.B.E., V.S., 36 Academy Street, Inverness.

Western Island Ponies.—R. W. R. Mackenzie, Earlshall, Leuchars.

Shetland Ponies.—Charles Aitkenhead, Carr House Farm, New Seaham; Graham Clark, Ashbank, Aberdeen.

Blackface.—William Mitchell, Hazelside, Douglas; James Clark, Crossflatt, Muirkirk; Robert S. Fisher, Ballimore, Balquhidder.

Cheviot.—Charles S. M'Kerrow, Boreland of Southwick, Dumfries; Charles Scott, Milsington, Hawick.

Border Leicester.—Matthew Templeton, Sandyknowe, Kelso; James Jeffrey, Little Spott, Dunbar.

Half-Bred.—Andrew Douglas, Saughtree, Newcastleton.

Oxford Down.—William B. Dickinson, Longcroft, Oxton.

Suffolk.—S. R. Sherwood, Playford, Ipswich.

Shropshire.—E. Craig Tanner, Eyton-on-Severn, Shrewsbury.

Goats.—R. Pease, Sledwich, Barnard Castle, Yorks.

Pigs.—(*Large White*)—James Weir, Woodilee Farm, Lenzie, Glasgow; (*Middle White and Berkshire*)—Arthur Hiscock, Manor France Farm, Stourpaine, Blandford, Dorset; (*Large Black*—S. R. Sherwood, Playford, Ipswich.

Poultry.—C. Sneddon, Kirkham, Lancs. (Classes 23 to 54, 67 to 70, 73 to 90, and 103 to 109 jointly); C. M. Crichton, Estates Office, Laurencekirk (Classes 1 to 22, 55 to 66, 71 and 72, 91 to 102, and 103 to 109 jointly).

Dairy Produce.—Wilfred E. Smith, N.D.D., 12 Grassmarket, Edinburgh.

Bee Appliances and Honey.—Rev. John Beveridge, B.D., E.B., S.B.A., U.F. Manse, Gartmore.

Wool.—James Noble, Wool Stapler, 23 Bridge Street, Galashiels.

EDINBURGH SHOW, 1919.

ALTERATIONS IN PRIZE LIST.

On account of animals failing to comply with the Regulations as to calving, foaling, and farrowing, the following changes have taken place in the list of animals for which prizes were awarded:—

CATTLE

GALLOWAY.

CLASS 18. HEIFER, calved on or after 1st December 1916.—Premiums, £10, £5, £3, and £2.

*	No. 103	Thomas Biggar & Sons, Chapelton, Dalbeattie, "Lizzie 21st of Chapelton" (25,710).
1st	No. 106	Robert Graham, Auchengassel, Twynholm, "Jenny of Auchengassel" (25,879).
2nd	No. 105	W. B. Donaldson, Auchinedin, Blanefield, "Mabel 2nd of Killearn" (25,805).
3rd	No. 107	D. & J. Little, Corriehalls, Lockerbie, "Nettie 3rd" (25,993).
4th	No. 102	Thomas Biggar & Sons, Chapelton, Dalbeattie, "Lizzie 20th of Chapelton" (25,709).

HIGHLAND.

CLASS 24. HEIFER, calved in 1916.—Premiums, £10, £5, £3, and £2.

*	No. 142	The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Donnag Riabhach XII. of Atholl."
1st	No. 143	Lady Currie of Garth, Balnacraig Farm, Fortingall, "Ban-Righ of Garth."
2nd	No. 141	The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Te Riabhach XVI. of Atholl."
3rd	No. 145	Lady Ogilvy-Dalgleish of Errol, Errol Park, Errol, Perthshire, "Almira II. of Errol."
4th	No. 146	Lady Ogilvy-Dalgleish of Errol, Errol Park, Errol, Perthshire, "Flora III. of Errol."

BRITISH FRIESIAN.

CLASS 40. HEIFER, calved in 1917 or 1918.—Premiums, £6, £3, and £2.

1st	No. 200	Hugh Brown, Colton Mains, Dunfermline, "Colton Bram Roylette 2nd" (28,040).
2nd	No. 206	Major David Anderson Spence, V.D., of Conveth Mains, Dunninald Mains, Montrose, "Wiggington Saakje III."
*	No. 202	Hugh Brown, Colton Mains, Dunfermline, "Colton Bram Juliana" (28,032).
3rd	No. 207	Major David Anderson Spence, V.D., of Conveth Mains, Dunninald Mains, Montrose, "Dunninald Irene."

HORSES

DRAUGHT.

CLASS 51. YELD MARE, foaled before 1916.—Premiums, £12, £9, £6, and £4.

*	No. 303	M. S. Thomson, Lambden, Spotsmains, Kelso, "Patience" (43,787).
1st	No. 299	David Bell, Woodfield, Eastriggs, "Tango Lady."
2nd	No. 298	J. D. S. Baillie, Ransfield, Ratho, "Lady Irene" (40,404).
3rd	No. 302	G. Bertram Shields, Dolphingstone, Tranent, "Yerimo."
4th	No. 300	Robert Buchan, Bonnington Farm, Kirknewton, "Clifton Minnie" (42,622).

PIGS

LARGE WHITE BREED.

CLASS 140. SOW, farrowed in 1918.—Premiums, £6, £3, and £2.

1st	No. 815	The Earl of Rosebery and Mid-Lothian, K.G., K.T., Home Farm, Dalmeny House, Edinburgh, "Dalmeny Mana."
*	No. 814	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook Poppy III."
2nd	No. 811	Edinburgh Corporation Farm Colony, Farm Colony, Lasswade, "Springfield Perfection XI." (139).
3rd	No. 813	D. W. Gunn, Craigcrook Farm, Blackhall, Edinburgh, "Craigcrook Poppy."

BERKSHIRE.

CLASS 148. SOW, any age.—Premiums, £6, £3, and £2.

1st	No. 836	A. Henderson Bishop, Thornton Hall, Thorntonhall Station, by Glasgow, "Minley Sunshine" (18,894).
2nd	No. 834	A. Henderson Bishop, Thornton Hall, Thorntonhall Station, by Glasgow, "Suddon Joan" (20,914).
*	No. 835	A. Henderson Bishop, Thornton Hall, Thorntonhall Station, by Glasgow, "Suddon Nora" (20,913).
3rd	No. 839	Steuart Bayley Hog, Newliston, Kirkliston, "Lothian Marchioness."

The animals failing to qualify are marked thus (*).

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

As at 30th NOVEMBER 1920

	£	s.	d.	£	s.	d.
I. Invested in War Stock, Heritable Bonds, Debenture and Preference Railway Stocks, Bank Stocks, &c. . .				£83,322	5	10
II. Temporary Loans, £8,750 with Edinburgh Corporation .				8,750	0	0
III. Estimated Value of Building, No. 3 George IV. Bridge	£3,100	0	0			
IV. Estimated Value of Furniture, Paintings, Books, &c.	1,000	0	0			
				4,100	0	0
V. Arrears of Subscriptions considered recoverable . .				142	16	6
VI. Balance at 30th November 1920				1,068	13	2
Amount of General Funds . .				£97,383	15	6
VII. Special Funds—						
Tweeddale Medal Fund—						
Heritable Bond, at 5½ per cent				£500	0	0
Sum on Deposit Receipt with British Linen Bank . .				75	0	0
				£575	0	0
Fife and Kinross Gold Cup Fund—						
£460 Great Central Railway Co. 3½ per cent Second Debenture Stock	£400	0	0			
Sum on Deposit Receipt with British Linen Bank	30	0	0			
				430	0	0
Paisley Gold Cup Fund—						
£802, 8s. 8d. North British Railway Co. 3 per cent Debenture Stock	£600	0	0			
Sum on Deposit Receipt with British Linen Bank	65	0	0			
				665	0	0
Renfrewshire Gold Cup Fund—						
£668, 14s. 4d. North British Railway Co. 3 per cent Debenture Stock	£500	0	0			
Sum on Deposit Receipt with British Linen Bank	60	0	0			
				560	0	0
William Taylor Memorial Prize Fund—						
£401, 2s. 7d. North British Railway Co. 3 per cent Debenture Stock	£300	0	0			
Sum on Deposit Receipt with British Linen Bank	50	0	0			
				350	0	0
Note.—The above Special Funds are entered at cost price. The value at 30th November 1920 was £1137, 18s.				£2,580	0	0
Balances with British Linen Bank at 30th November 1920				95	4	6
Amount of Special Funds . .				£2,675	4	6

DAVID WILSON, *Treasurer.*
DAVID FERRIE, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor*

Edinburgh, *5th January* 1921.

ABSTRACT of the ACCOUNTS of the HIGHLAND and

CHARGE.

1. Balance as at 30th November 1919			£147 18 2
2. Arrears of Subscriptions outstanding at 30th November 1919		£130 15 6	
Whereof due by Members who have compounded for life, and whose arrears are thereby extinguished	£13 10 0		
Sums ordered to be written off	69 16 0		
		83 6 0	
			47 9 6
3. Interests and Dividends—			
(1) Interests—			
On Heritable Bonds, less Income-tax		£661 10 0	
On Railway Debenture and Preference Stocks, do.		1,213 17 6	
On Colonial Government Stocks, do.		328 8 10	
On Annuity Stocks, do.		51 16 0	
On Edinburgh Corporation Loans, do.		250 3 9	
On War Stock		499 19 10	
		£3,005 15 11	
(2) Dividends—			
On Bank Stocks, less Income-tax		858 0 10	
			3,863 16 9
4. Subscriptions—			
Annual Subscriptions		£1,882 12 6	
Life Subscriptions		3,415 10 0	
			5,298 2 6
5 'Transactions'—Advertising			33 10 0
6. Income-tax repaid for year to 5th April 1920			1,313 9 6
7. Receipts from Aberdeen Show			19,947 2 2
8. Investments realised			3,000 0 0
Sum of the Charge			£33,651 8 7

Edinburgh, *5th January* 1921

AGRICULTURAL SOCIETY of SCOTLAND for Year 1919-1920.

DISCHARGE.

1.	**Establishment Expenses**—			
	Salaries and Wages—Secretary, £983, 6s. 8d.; Chief Clerk, £558, 6s. 8d.; Second Clerk, £354, 18s. 10d.; 2 Extra Clerks, £107, 10s.; Typist, £121, 13s. 4d.; Messenger, Wages, £137, 10s.; Cleaning Allowance, £44, 4s.; Retiring Allowance to Messenger, £52			£2,309 9 6
	Feu-duty, £28; Taxes, £104, 13s. 6d.			132 18 6
	Coals, Gas, Electric Light, &c.			82 4 1
	Repairs and Furnishings, £54, 16s. 7d.; Telephone and Telegrams, £19, 12s. 6d.; Insurance, £115, 7s. 3d.			189 16 4
				£2,714 8 5
2.	**Fee** to Auditor of Accounts for 1918-1919			75 0 0
3.	**Education**			157 9 1
4.	**Chemical Department**—			
	Fee to Chemist		£100 0 0	
	Analyses to Members and Expenses		358 18 3	
				458 18 3
5.	**Veterinary Department**—			
	Medals to Students		£23 0 0	
	"Grass Sickness" Investigation	£269 13 10		
	Less Receipts	128 3 0		
			141 10 10	
	"Louping-Ill" Investigation		12 11 0	
	Meeting in connection with Diseases of Animals		3 2 0	
				180 3 10
6.	**Botanical and Entomological Department**			25 0 0
7.	**Dairy Department**—			
	Expenses of Examination held at Kilmarnock		£217 19 9	
	Less Entry Fees		63 0 0	
				154 19 9
8.	**Society's 'Transactions,'** 1919			1,891 14 10
9.	**Ordinary** Printing, £221, 9s. 8d.; Advertising, £40, 6s. 3d.; Stationery, Books, &c., £211, 1s. 10d.; Postages, £110; Bank and Post Office Charges, £13, 4s. 8d.			596 2 5
10.	**Salary** to Consulting Engineer			125 0 0
11.	**Grants** to Public Societies			88 8 0
12.	**Miscellaneous** Payments			192 3 1
13	**Investments** made			4,250 0 0
14.	**Payments** in connection with Edinburgh Show, 1919			564 10 0
15.	**Payments** in connection with Aberdeen Show, 1920—			
	Premiums, £2661; Medals, £32, 15s. 6d.; Expenses as per page 401 of Show Account, £16,131, 14s. 3d.			18,825 9 9
16.	**Premiums** and Medals for Local Shows and District Competitions			426 2 6
17.	**Certificates** and Medals for Long Service			135 5 7
18.	**Experiments** with Agricultural Draining Machine		£971 13 2	
	Less Sums received for work done		387 0 0	
				584 13 2
	Note.—This sum falls to be repaid by the Ministry of Agriculture and the Board of Agriculture for Scotland.			
19.	**Inspection** of Turnip-Lifting Machine			55 4 3
20	**Material** purchased for Future Shows			707 13 1
21.	**Expenses** attending Conferences in London			197 17 11
22.	**Arrears** removed from Subscription List at 30th November 1920			34 5 0
23.	**Arrears** outstanding at 30th November 1920			142 16 6
24	**Balances** as at 30th November 1920—			
	With Royal Bank of Scotland—			
	Edinburgh Account		£697 13 2	
	London Account		364 0 0	
			£1,061 13 2	
	Balance due by Secretary		7 0 0	
				1,068 13 2
	Sum of Discharge			£33,651 8 7

DAVID WILSON, *Treasurer.*
DAVID FERRIE, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor.*

ABSTRACT of the ACCOUNTS

CHARGE.

1. LOCAL SUBSCRIPTIONS—		
Donation from Aberdeen Town Council		£100 0 0
Subscription		2 10 0
2. AMOUNT COLLECTED DURING SHOW—		
Gates	£11,387 3 6	
Grand Stand	1,675 3 3	
Catalogues and Awards	829 15 4	
Cloak-Rooms and Lavatories . . .	18 6 0	
Rent of Motor Garage and Tickets sold . .	107 4 0	
		14,017 12 1
3. FORAGE SOLD		23 18 6
4. RENT OF STALLS		5,104 11 6
5. RENT OF REFRESHMENT BOOTHS		45 0 0
6. ADVERTISEMENTS IN CATALOGUE AND PREMIUM LIST . .		252 7 0
7. SUBSCRIPTIONS IN AID OF PREMIUMS		352 12 6
8. TELEPHONE CALLS IN SHOWYARD		24 11 1
9. INTERESTS FROM TEMPORARY LOANS		23 19 6
		£19,947 2 2

Note.—From the above balance of	£1,121 12 5
Deduct Premiums undrawn at 30th November . . .	333 0 0
	£788 12 5
To which there falls to be added sums due by exhibitors for fitting up stands, amounting to . . .	855 2 9
Making probable surplus . . .	£1,643 15 2

EDINBURGH, *5th January* 1921.

of the ABERDEEN SHOW, 1920.

DISCHARGE.

1. SHOWYARD—						
Fitting up Yard (from which falls to be deducted sums to be received from Exhibitors, as per note on page 400)	£9,600	0	0			
Insurance, £71, 9s. 6d.; Rosettes, £69, 12s.	141	1	6			
Penning and Feeding Poultry, £29, 16s. 6d.; Cartage, £12, 16s. 6d.	42	13	0			
Hire of Turnstiles, £34; Railway Carriages, £32, 19s. 5d.	66	19	5			
Sleepers and Cartage, £154, 3s. 2d.; Miscellaneous, £8, 0s. 9d.	162	3	11			
Salary and Office Expenses to John Reid, Showyard Erector	500	0	0			
				£10,512	17	10
2. FORAGE				820	19	6
3. POLICE				131	3	8
4. TRAVELLING EXPENSES of Judges, Stewards, &c.				366	18	2
5. HOTEL AND LUNCHEONS—						
Hotel Bills for 31 Directors, 14 Stewards, and 43 Judges	£437	13	1			
Luncheons in Showyard for Directors, Judges, attending Members, Members of Committee, Staff, and Breakfasts and Teas	496	14	11			
				934	8	0
6. ASSISTANTS and Attendants				676	9	0
7. PRINTING, Badges, and Stationery				1,596	8	6
8. ADVERTISING and Bill-posting				750	16	4
9. HIGHLAND INDUSTRIES				5	0	0
10. FORESTRY EXHIBITION—prizes awarded				5	0	0
11. VETERINARY INSPECTION				10	10	0
12. CONCERT, &c., for Attendants				6	5	0
13. TREASURER				25	0	0
14. POSTAGES				120	0	0
15. POST OFFICE and Telephones				48	8	4
16. MISCELLANEOUS PAYMENTS				121	9	11
				£16,131	14	3
17. PREMIUMS drawn at 30th November 1920				2,693	15	6
				£18,825	9	9
BALANCE				1,121	12	5
				£19,947	2	2

DAVID WILSON, *Treasurer.*
DAVID FERRIE, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor.*

ABSTRACT of the ACCOUNTS of the

CHARGE.

I. **Funds** as at 30th November 1919—				
Amount on Heritable Bond at 5 per cent				£3,500 0 0
£3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock				2,650 0 0
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock				611 10 6
£500 Queensland 3½ per cent Inscribed Stock, 1950-70 .				450 1 0
£300 Registered 5 per cent National War Bonds, 1922, 'A' Account				300 0 0
£190 London and North-Western Railway Company 4 per cent Guaranteed Stock				259 1 11
				£7,770 13 5
Balance on Account Current with Royal Bank of Scotland .				320 7 3
II. **Interest on Investments**—				£8,091 0 8
On £3,500 on Heritable Bond at 5 per cent for half-year to Whitsunday 1920			£87 10 0	
Less tax			26 5 0	
			£61 5 0	
Do. at 5½ per cent, for half-year to Martinmas 1920		£96 5 0		
Less tax . . .		28 17 6		
			67 7 6	
			£128 12 6	
On £3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, for year to Martinmas 1920 . .		£95 16 0		
Less tax . . .		28 14 10		
			67 1 2	
On £550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, for year to 30th June 1920 .		£16 10 0		
Less tax . . .		4 19 0		
			11 11 0	
On £500 Queensland 3½ per cent Inscribed Stock, 1950-70, for year.			17 10 0	
On £300 5 per cent Registered National War Bonds, 1922, for year			15 0 0	
On £190 London and North-Western Railway Company 4 per cent Guaranteed Stock, for year to 30th June 1920 . .		£7 12 0		
Less tax . . .		2 5 8		
			5 6 4	
On £200 Edinburgh Corporation Loan for half-year to Martinmas 1920 . .		£4 18 8		
Less tax . . .		1 9 7		
		£3 9 1		
On £200 Edinburgh Corporation Loan from 8th to 9th April 1920 . .	£0 0 6			
Less tax .	0 0 1			
		0 0 5		
On £200 Edinburgh Corporation Loan from 17th February to Whitsunday 1920 .	£2 5 0			
Less Tax . .	0 13 6			
		1 11 6		
			5 1 0	
				250 2 0
III. **Income Tax** repaid for year to 5th April 1920 . . .				88 9 6
IV. **Investments Realised**—				
Temporary Loan with Edinburgh Corporation—1920. April 20. Of this date			£200 0 0	
Sum of Charge . .				£8,429 12 2

Edinburgh, *5th January* 1921

ARGYLL NAVAL FUND for the Year 1919-1920.

DISCHARGE.

I. **Allowances** to the seven following Recipients—

I. K. D. Hutchison (sixth year)		£40 0 0
R. E. S. Hugonin (fifth year)		40 0 0
E. C. G. Greenlees (fifth year)		40 0 0
J. G. Maclean (fifth year)		40 0 0
A. F. Campbell (third year)		40 0 0
R. A. Forbes (first year)		40 0 0
J. A. C. MacGregor (first half-year)		20 0 0
		£260 0 0

II. **Investments** made—

Loans to Edinburgh Corporation—		
1920. Feb. 17. Of this date	£200 0 0	
April 8. Do.	200 0 0	
	£400 0 0	

III. **Funds** at 30th November 1920—

Amount of Loan on Heritable Bond at 5½ per cent	£3,500 0 0	
£3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, purchased at	2,650 0 0	
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, purchased at	611 10 6	
£500 Queensland 3½ per cent Inscribed Stock, 1950-70, purchased at	450 1 0	
£100 Registered 5 per cent National War Bonds, 1922, "A" Account	100 0 0	
£200 do., 1923	200 0 0	
£190 London and North-Western Railway Company 4 per cent Guaranteed Stock, purchased at	259 1 11	
£200 Temporary Loan with Edinburgh Corporation	200 0 0	
	£7,970 13 5	
Note.—The above Funds are entered at cost price. The value at 30th November 1920 was £6178, 7s. 8d.		
Balance on Account Current with Royal Bank of Scotland	198 18 9	
		8,169 12 2
Sum of Discharge		£8,429 12 2

DAVID WILSON, *Treasurer.*
DAVID FERRIE, *Chairman of Directors.*
WM. HOME COOK, C.A., *Auditor.*

VIEW OF RECEIPTS AND PAYMENTS
For the Year 1919-1920.

RECEIPTS.

1. ANNUAL SUBSCRIPTIONS AND ARREARS received . . .			£1,753 0 6
2. LIFE SUBSCRIPTIONS			3,415 10 0
3. INTERESTS AND DIVIDENDS—			
Interests		£3,005 15 11	
Dividends		858 0 10	
			3,863 16 9
4. 'TRANSACTIONS'			33 10 0
5 INCOME TAX repaid for year to 5th April 1920 . . .			1,313 9 6
6. RECEIPTS in connection with Aberdeen Show . . .			19,947 2 2
			£30,326 8 11

PAYMENTS.

1. ESTABLISHMENT EXPENSES—			
Salaries and Wages		£2,309 9 6	
Feu-duty, Taxes, Coals, Gas, Insurance, Repairs and Furnishings . . .		404 13 11	
		£2,714 3 5	
2. FEE TO AUDITOR of Accounts, 1918-1919 . .		75 0 0	
3. EDUCATION		157 9 1	
4. CHEMICAL DEPARTMENT		458 18 3	
5. VETERINARY DEPARTMENT		180 3 10	
6. BOTANICAL AND ENTOMOLOGICAL DEPARTMENT		25 0 0	
7 DAIRY DEPARTMENT .		154 19 9	
8. SOCIETY'S 'TRANSACTIONS'		1,891 14 10	
9. ORDINARY Printing, Advertising, Stationery, Books, Postages, and Bank Charges		596 2 5	
10. SALARY to Consulting Engineer .		125 0 0	
11. GRANTS to Public Societies . .		88 3 0	
12. MISCELLANEOUS		192 3 1	
13. PAYMENTS in connection with Edinburgh Show, 1919—			
Premiums	£191 10 0		
Expenses	373 0 0		
		564 10 0	
14. PAYMENTS in connection with Aberdeen Show, 1920—			
Premiums	£2,693 15 6		
General Expenses . . .	16,131 14 3		
		18,825 9 9	
15. PREMIUMS AND MEDALS for Local Shows and District Competitions		426 2 6	
16. CERTIFICATES AND MEDALS for Long Service		135 5 7	
17. EXPERIMENTS with Agricultural Draining Machine		584 13 2	
18 INSPECTION of Turnip-Lifting Machine .		55 4 3	
19. MATERIAL purchased for future Shows .		707 13 1	
20. EXPENSES attending Conferences in London		197 17 11	
			28,155 13 11
BALANCE OF RECEIPTS . .			£2,170 15 0

DAVID WILSON, *Treasurer.*
DAVID FERRIE, *Chairman of Directors*
WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, *5th January* 1921.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 7TH APRIL 1920.

Mr **David Ferrie** of Parbroath, in the Chair.

Present. — *Vice-President* — Mr William Duthie. *Ordinary Directors* — Colonel J. F. Carruthers; Mr Charles Douglas, D.Sc., C.B.; Mr W. A. Dron, Mr David Ferrie; Mr W. P. Gilmour; Mr J. E. Kerr; Mr Thomas Kirk; Mr John M'Caig, Mr James M'Laren; Mr Robert Macmillan, Mr Hugh Martin; Mr William Meiklem; Mr Robert Park; Colonel J L. Reid; Sir Hugh Shaw Stewart, Bart., C.B, Mr R. A Smith; Mr Phipps O. Turnbull *Extraordinary Directors*—Mr William Anderson; Mr George Bean; Mr William Carrick; Mr James Elder; Mr John Elder; Mr William Elliot, Mr A. F Irvine; Mr James M'Queen, Mr G. Bertram Shields, Mr John P. Sleigh, Mr R. D. Thom. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher.

The late Mr William Macdonald.

Before proceeding with the business of the Meeting, the **Chairman** made sympathetic reference to the death of Mr William Macdonald, Inverness, and submitted a Resolution expressing the regret of the Directors at his death, and their appreciation of his services to the Society as a Director The Resolution was unanimously approved, the Directors present upstanding, and the Secretary was instructed to send a copy thereof to the family of the deceased.

Research in Animal Nutrition.

A letter was submitted from the Joint Secretary of the Committee engaged in promoting the Institute of Research in Animal Nutrition, Aberdeen, stating that Mr John Rowett, of London, had now promised a sum of £10,000 towards the scheme. As the Government would put forward a similar amount, an immediate start would be made with the erection of the buildings and their equipment. In view of this a detailed scheme, with plans, was being prepared for submission to the Government. In these circumstances, the Committee desired that their letter of 21st February should be held in abeyance pending the preparation of the scheme and plans.

St Kilda.

A letter was read from the Rev. D. Cameron, The Manse, St Kilda, conveying the thanks of the islanders for the grant of seed potatoes and seed oats.

The **Secretary** explained that Messrs Alexander Cross & Sons had not yet been able to get the seeds sent out. There was no ship sailing from Glasgow before the end of May, but they had some hopes of getting a trawler from Aberdeen to take the consignment.

At the suggestion of Mr **Charles Douglas**, it was agreed to ask the help of the Board of Agriculture for Scotland in the matter.

Glasgow Veterinary College.

A letter was submitted from the Secretary of the Glasgow Veterinary College thanking the Directors for the proposed grant of £800, and stating that steps were being taken to obtain the assurance asked for from the Board of Agriculture for Scotland.

Isle of Skye.

A letter was read from Miss C. F. Boyd, in which she called the attention of the Directors to two letters which she enclosed, and suggested that the Society should get into personal touch with the writers, and others interested in the affairs of the Island of Skye, and endeavour to adopt some scheme by means of which public or private enterprise might be set afoot for the relief of the Islanders. One of the letters was from the Rev. D. G. Macdonald, Portree. The Secretary said that, on receipt of the letters, he had communicated with the Secretary of the Board of Agriculture, who informed him that the Secretary for Scotland and the Board had been giving the matter their attention. He understood that the question was mainly one of transport The Board pointed out that it would probably be possible, through the Scottish Agricultural Organisation Society and the Smallholders' Organisation, to supply the necessary seeds at reasonable prices. The matter, however, was continuing to receive the attention of the Secretary for Scotland and the Board of Agriculture.

After discussion, the CHAIRMAN stated that as it was mainly a questions of transport, and the matter was being dealt with by the Secretary for Scotland and the Board of Agriculture, he did not think the Society need take any action, and this was agreed to.

Scottish Council of Agriculture.

A letter was submitted from the Board of Agriculture for Scotland, enclosing copy of the Scheme for the Constitution of Agricultural Executive Committees and of the Scottish Council of Agriculture, and stating that the Secretary for Scotland was prepared to nominate the Chairman of Directors of the Society as a member of the Council *ex officio.*

The CHAIRMAN said, if the proposal was agreed to, he would be glad to act as a member of the Council during his term of office.

It was unanimously agreed to approve of the proposed arrangement.

Aberdeen Show, 1920.

Prize List, &c.—A Minute of Meeting of Shows Committee, dated 7th April, was submitted.

The Minute dealt, *inter alia*, with the following matters:—

Bee Appliances and Honey.—It was reported that the Scottish Beekeepers' Association had agreed to provide half the prize money for these classes.

Casares Junior Challenge Cup.—The SECRETARY reported that he had been in communication with Mr Casares, and it now appeared that the Cup offered by him was to be a Challenge Cup for the best Shorthorn Bull Calf not exceeding fifteen months old. The Committee recommended acceptance of the Cup, and suggested that Mr Casares be asked to agree to a condition that it become the property of the exhibitor who shall win it three times, not necessarily in succession.

Special Prizes.—Mr WILLIAM DUTHIE, Tarves, had intimated an offer of Special Prizes amounting to £26 for Shorthorn Bulls calved after 20th April 1919. The Committee recommended acceptance of this offer.

Champion Medals for Pigs.—On the suggestion of Mr P. O. Turnbull, the Committee recommended that a President's Champion Medal be offered for each breed of pigs.

On the motion of Mr G. B. Shields, Convener of the Shows Committee, the Minute was approved, and Mr Duthie was accorded a cordial vote of thanks for his generous offer of Special Prizes.

Attending Members.—The following Directors were appointed as Attending Members: *Shorthorn*—R. A. Smith and Colonel J. L. Reid; *Aberdeen-Angus and Fat Cattle*—A. F. Irvine and W. A. Dron; *Galloway*—Murray Little and James M'Queen; *Highland*—Sir Hugh Shaw Stewart, Bart., C.B.; *Ayrshire*—Thomas Kirk and John M'Caig; *Shetland Cattle*—H. B. Marshall; *British Friesian*—William Carrick; *Draught Stallions*—George Bean and Charles Douglas, D.Sc., C.B.; *Mares*—William Meiklem and Robert Park; *Hunters*—Colonel F. J. Carruthers and Sir Kenneth Mackenzie, Bart.; *Hackneys, Ponies, and Harness Horses*—William Anderson and Moffat S. Thomson; *Highland Ponies*—A. E. F. Morison;

Western Island Ponies—W. P. Gilmour; *Shetland Ponies*—Duncan M. Wallace; *Blackface*—James M'Laren and John Elliot; *Cheviot*—Alexander Cowan and General Archibald Stirling; *Border Leicester*—David R. Arnot and James C. Booth; *Half-Bred*—W. Wilson; *Oxford Down*—Major D. A. Spence; *Suffolk*—John P. Sleigh; *Shropshire*—Major George Cameron; *Pigs* (*Large White*)—John Elder; *Pigs* (*Large Black*)—James Durno; *Poultry*—Sir James Taggart and Dr J. F. Tocher; *Dairy Produce*—Lord Forteviot; *Bee Appliances and Honey*—John Michie; *Wool*—John Elliot.

Nomination of Directors.

The SECRETARY submitted the usual Report on Meetings of Members, held in the various Show Divisions, for the nomination of Ordinary Directors.

Law and Parliamentary.

A Minute of Meeting of Committee, dated 15th March, was read and approved.

The Minute dealt with the following matters:—

Milk Regulations.—A request had been received from the Milk Sub-Committee of the Profiteering Act Central Committee, to nominate two members who were in touch with questions relating to the distribution of milk and milk products, and to the organisation of producers and others concerned in the milk trade, to give evidence before the Committee. It was recommended that Mr John M'Caig of Belmont, Stranraer, and Mr John Drysdale, Scottish Agricultural Organisation Society, be asked to give evidence on behalf of the Society.

Railway Charges for Stock, &c., to and from Shows.—A letter had been received from the Secretary of the Royal Agricultural Society, stating that arrangements had been made for a deputation to wait on the Minister of Transport on 24th March, and inviting the Society to appoint three representatives. Mr David Ferrie, Mr Charles Douglas, D.Sc., C.B., and Mr G. B. Shields, had been nominated to represent the Society on the deputation.

The CHAIRMAN reported shortly on the meeting of the deputation with the Minister of Transport, Sir Eric Geddes. Prior to 1919 unsold exhibits, both stock and implements, returning from Shows, were carried at half rates, and attendants in charge of stock travelled free. These privileges were now withdrawn. Sir Eric Geddes had pointed out that the body having the sole power to deal with the matter was the Railway Rates Advisory Committee, and he had undertaken to represent the matter favourably to that Committee.

Agricultural Education.

A Minute of Meeting of Education Committee, dated 7th April, was submitted and approved.

The Minute stated:—

Vice Convener.—That in view of the absence of the Convener, through illness, it was recommended that Mr Charles Douglas be appointed Vice-Convener of the Committee.

Conference on Agricultural Education.—That, in accordance with the remit from the Board in June 1919, the Committee had decided to hold a Conference of Members of Education Authorities, and others interested in the future of Agricultural Education, for Tuesday 1st June, at 2.30 P.M. The terms of the letter of invitation to the Conference had been adjusted, and also two Resolutions to be submitted at the Conference.

Lieut.-Colonel CARRUTHERS suggested that, in addition to representatives of Education Authorities and of the Board of Agriculture and the Scottish Education Department, representatives of the Agricultural Colleges in Scotland be invited to the Conference.

Argyll Naval Fund.

A Minute of Meeting of Committee, dated 7th April, was submitted and approved.

The Minute recommended that two appointments be made to the list of beneficiaries—viz.: John Alexander Campbell MacGregor, and Reginald Arthur Forbes.

"Revolt" Drain Excavator.

A letter was submitted from the Board of Agriculture for Scotland, with accompanying report by one of their Inspectors on a recent private demonstration in the use of the "Revolt" Drain Excavator, suggesting that the merits of this machine might be further investigated by the Society.

Veterinary Surgeons Act Amendment Bill, 1920.

The Opinion of the Society's Law Agents, Messrs Tods, Murray, & Jamieson, W.S., with regard to the above Bill was submitted, this being to the effect that there was nothing in the Bill, so far as they could see, conferring on the Royal College of Veterinary Surgeons any disciplinary powers against unregistered practitioners beyond what they already possessed.

Deficient Samples.

Dr J. F. Tocher, Consulting Chemist to the Society, submitted a report on Samples of Manures and Feeding-Stuffs analysed by him for members during the past month.

Showyard Plant.

A valuation, by a mutual Valuator, of Showyard Plant and material taken over by the Society from Messrs D. Macandrew & Co., was submitted, amounting to £510, 1s. 2d.

Charges for Delivery at Show.

The following were appointed to represent the Society in any joint action which might be taken, along with representatives of the Scottish Agricultural Implement Dealers' Association, regarding certain charges proposed by the Railway Companies for delivery of goods to the Showyard: the Chairman of Directors, the Convener of the Implement Committee, and Mr John Elder, Berwick-on-Tweed.

Exhibition of Motor Vehicles at Show.

The Secretary reported that the Society of Motor Manufacturers and Traders declined to allow members of that Society to exhibit motor trucks and vehicles at the Show, while such permission was granted in the case of the Shows of the Royal Agricultural Society of England and the Royal Dublin Society. Complaint regarding this had been received from two firms who desired to exhibit these vehicles at Aberdeen.

After discussion, it was agreed to bring the matter before Mr H. G. Burford, Chairman of the Agricultural Committee of the Society of Motor Manufacturers and Traders, and to notify the two firms in question that the Society would give them its support in any action they might take in the matter.

MEETING OF DIRECTORS, 2ND JUNE 1920.

Mr David Ferrie of Parbroath, in the Chair.

Present.—Ordinary Directors—Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr James Durno; Mr John Elliot; Mr David Ferrie; Mr Alexander Forbes; Mr J. E. Kerr; Mr John M'Caig; Mr James M'Laren; Captain Robert Macmillan; Mr H. B. Marshall; Mr Hugh Martin; Mr William Meiklem; Colonel John L. Reid; Mr R. A. Smith; Sir Hugh Shaw Stewart, Bart., C.B.; General Archibald Stirling; Mr Moffat S. Thomson; Mr Phipps O. Turnbull; Mr Duncan M. Wallace. *Extraordinary Directors*—Mr George Bean; Mr William Carrick; Mr James Elder; Mr William Elliot; Mr A. F. Irvine; Mr Murray Little; Mr James M'Queen; Mr J. P. Sleigh; Mr R. D. Thom. *Treasurer*—Sir David Wilson, Bart., D.Sc. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher. *Auditor*—Mr Wm. Home Cook.

The late Mr John C. Robertson.

Before proceeding with the business of the Meeting, the Chairman referred in sympathetic terms to the death of Mr John C. Robertson, Fodderty, a Director of the Society, and moved that a Resolution be engrossed in the Minutes expressing the deep regret with which the Directors received the intimation of his death, and their sense of the valuable services rendered by him to the Society.

The Resolution was unanimously adopted, the members present upstanding, and the Secretary was instructed to send an Extract thereof to Mrs Robertson.

Fish Meal for Feeding Pigs.

A letter was read from Messrs Walter Mitchell & Sons, Bacon Curers, Ayr, drawing attention to the evil effects of feeding pigs for bacon-curing purposes on Fish Meal. The Secretary stated that in acknowledging the letter he had asked Messrs Mitchell if their view was that Fish Meal should be entirely excluded from the diet of pigs, or to what extent it might be used, and what precisely was the evil effect upon the bacon. Their reply had not yet been received.

Aberdeen Show, 1920.

A Minute of Meeting of Shows Committee, dated 2nd June, was submitted and approved.

The Minute dealt with the following subjects:—

Railway Privileges.—The Ministry of Transport had agreed to restore the former privileges whereby Stock returning from the Show unsold were carried at half rates, and men with Stock travelled free.

Entertainment Tax.—The Board of Customs and Excise had again granted exemption from Entertainment Tax.

Catalogues.—It was recommended that the price of the Stock Catalogue on this occasion be 1s. 6d.; that the number of Catalogues printed be 12,500; and that there be one stand only for the sale of Catalogues, near the Entrance Gate.

Wool Demonstrations.—It was recommended that Mr Noble, Judge of Wool, be approached with a view to his giving demonstrations on Wool during the Show.

Reserved Seats in Grand Stand.—It was recommended that the prices for reserved seats in the Grand Stand on the Wednesday and Thursday afternoons be 5s., 3s., and 1s., for reserved, unreserved, and general enclosure respectively—other times to be in proportion.

Catering in Showyard.—The Secretary reported that the Catering Committee had arranged for four licensed Refreshment Stands, as usual, in the Showyard. Two of these would be occupied by Mr John Mitchell, Aberdeen, one by Messrs White, Glasgow, and one by Messrs Fairley, Edinburgh. In addition to these, and with the view of relieving the congestion in the Catering Department, it had been arranged to provide a Tea Stand, which would be occupied by a firm of bakers and confectioners in Aberdeen. The British Women's Temperance Association would have a stand as usual.

Stirling Show, 1921.

On the recommendation of the Shows Committee, it was agreed to defer fixing the date of the Show at Stirling in 1921 until the Meeting of Directors in the Showyard at Aberdeen.

Dumfries Show, 1922.

The Shows Committee reported that Lieut.-Colonel Carruthers had been in negotiation with Mr W. Johnston, Dumfries, and that the site on which the Show was held on the last occasion at Dumfries would again be available. It was agreed that it be left to Lieut.-Colonel Carruthers and Captain R. Macmillan, with powers, to arrange with Mr Johnston as to the rent to be paid for the ground.

Implements.

A Minute of Meeting of Implements Committee, dated 2nd June, was submitted and approved.

The Minute contained the following:—

Tractor Ditcher.—An Interim Report on the work of the Tractor Ditcher during the past year was submitted. (See Report of the General Meeting, p. 429.)

New Implements.—The following were recommended as Judges of New Implements at the Aberdeen Show—Mr G. Bertram Shields, Mr R. D. Thom, and Mr William Carrick. *Reserves*—Mr James M'Laren and Mr R. A. Smith.

Glasgow Veterinary College.

A letter was submitted from the Secretary of the Glasgow Veterinary College to the effect that the Board of Agriculture were not yet in a position to give the assurance required as a condition of the additional grant of £800 agreed to at the Meeting of Directors on 3rd March. The grant, therefore, could not be authorised at the General Meeting to be held that day.

On the motion of Mr CHARLES DOUGLAS, D.Sc., C.B., Mr Alexander Cross of Knockdon was re-elected as the Society's representative on the Board of Governors of the College.

Delivery of Implements.

A letter was submitted from the Ministry of Transport, in reply to the representation contained in a letter from Messrs John Wallace & Sons, Ltd., Glasgow, which was submitted at last Meeting of Directors, and ordered to be transmitted to the Ministry. The reply stated that, in the opinion of the Minister, no case had been made out for such preferential treatment as that suggested in the communication. The traffic was not in any way comparable to perishable goods or foodstuffs which, by their nature, required quite different treatment. The Railway Companies realised the importance of Agricultural Machinery; but whilst excessive demands of all kinds were being made upon the railways, mainly because of the falling-off in coastwise trade, it was not to be expected that any traffic could enjoy such ample facilities as it would under normal conditions.

Conference on Agricultural Education.

The **Chairman** reported that the Conference on Agricultural Education, called by the Directors, had been held on the previous day. It had been largely attended by representatives of Education Authorities throughout Scotland, and by representatives of the Scottish Education Department and the Board of Agriculture for Scotland. An interesting discussion took place, and two Resolutions prepared by the Committee were carried.

Fair Trading Council.

The **Chairman** reported that the Society had been represented at two recent Conferences at the Ministry of Food, at the latter of which it was decided to form a Fair Trading Council for potatoes and other vegetables, the duties of which would be to advise the Food Controller as to supplies, price movements, and costs of production. He outlined the constitution and duties of the proposed Council, on which there would be seven representatives from Scotland, of which the Society was invited to nominate one.

On the motion of Mr **Charles Douglas**, the Chairman of Directors was unanimously nominated to represent the Society on the Fair Trading Council.

Animal Diseases Research Association.

A letter was read from the Secretary of the Animal Diseases Research Association thanking the Board for the support given to the Association in its initial stages.

New Members.

The **Secretary** reported that there were 697 candidates for election as members of the Society at the General Meeting to be held that afternoon. This number, along with 603 elected at the January meeting, made a total of 1300 new Members for the year.

Sale of Sheep Dips.

The following Resolution, passed by a Joint Committee of the Cheviot Sheep Society and the Blackface Sheep Breeders' Association, and communicated to the Directors for information, was remitted to the Science Committee for consideration and report:—

> "That the whole matter of the sale of Sheep Dips should be put in the same position as Fertilisers."

Other Resolutions relating to (1) the repeal of the Corn Production Act, (2) the settlement of soldiers on small holdings, and (3) the Diseases of Animals (Scotland) Bill, 1920, were submitted, but it was decided to take no action with regard to these.

Aberdeen Showyard.

The **Chairman** intimated that as a result of a meeting which he and the Secretary had had with the Strike Committee of the Carpenters' and Joiners' organisation at Aberdeen, a satisfactory arrangement had been arrived at whereby the joiners would continue at work on the Showyard erections.

Finance.

A Minute of Meeting of Committee, dated 1st June, was submitted, and, on the motion of Sir **David Wilson**, Convener, seconded by Mr **James M'Laren**, approved.

The Minute recommended increases of salaries of the Society's permanent staff, in view of the greatly increased cost of living. The increases, in so far as the Secretary, Chief Clerk, and Second Clerk were concerned, were based upon and were generally in accordance with the scheme in force in the Civil Services, as contained in the Report by the National Council for the Civil Services, published recently. The amounts recommended to be paid in excess of the normal or pre-war salaries were to be regarded as bonuses, and would fall to be increased or reduced on the lines laid down in that Report. The increases to take effect as from 1st March. John Stirton, Secretary, increase of £200 to £1000; Edward M. Cowie, Chief Clerk, increase of £100 to £600; A. S. Cavers, Second Clerk, increase of £50 to £350; Annie T. Maitland, Typist, increase of £20 to £130; W. Home Cook, Auditor, increase of £25 to £125.

MEETING OF DEPUTATION OF DIRECTORS HELD IN SHOWYARD, ABERDEEN, 21st JULY 1920.

Mr David Ferrie of Parbroath, in the Chair.

Present.—Vice-Presidents—The Marquess of Aberdeen, K.T.; Mr William Duthie, Collynie; Mr Thomas Gordon Duff of Drummuir. *Ordinary Directors*—Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr James Durno; Mr John Elliot; Mr David Ferrie; Mr W. P. Gilmour; Mr J. Ernest Kerr; Mr John M'Caig; Mr James M'Laren; Mr Robert Macmillan; Mr Henry B. Marshall; Mr Hugh Martin; Mr William Meiklem; Mr A. E. F. Morison; Mr R. A. Smith; Sir Hugh Shaw Stewart, Bart., C.B.; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr William Anderson; Mr George Bean; Mr William Carrick; Mr James Elder; Mr Garden A. Duff; Mr John Elder; Mr A. F. Irvine; Mr Murray Little; Mr James M'Queen; Mr G. Bertram Shields; Major D. A. Spence, V.D.; Mr John P. Sleigh; Mr R. D. Thom. *Consulting Engineer*—Professor R. Stanfield.

Stirling Show, 1921.

The Secretary submitted correspondence which he had had with the Caledonian Railway Company regarding suitable dates for the Stirling Show in 1921. After discussion, and in view of the fact that the dates of the Royal Agricultural Society's Show of next year were not yet fixed, it was decided to delay decision until the November meeting.

Milk Regulations.

A letter was submitted from the Secretary of the Inter-Departmental Committee on the Laws, Regulations, and Procedure under which Milk is sold in Scotland, inviting the Society to nominate one or more Members to give evidence before the Committee. The following gentlemen were duly nominated: Mr John M'Caig of Belmont, Stranraer, Mr W. P. Gilmour, Balmangan, and Major James Keith, Pitmedden.

Status of Secretary for Scotland.

It was agreed, on the invitation of the Town Council of Edinburgh, to nominate the Chairman of Directors to represent the Society at a Conference on 27th July in support of the Bill providing for the raising of the status and emoluments of the Secretary for Scotland to those of a Secretary of State.

Fair Trading Council.

The Chairman reported that he had nominated Mr James Elder, Athelstaneford Mains, as his deputy to attend meetings of the Fair Trading Council (Potatoes) at which he was unable to be present. Mr Elder's appointment was cordially confirmed.

Tractor Ditcher.

The Secretary reported that the Board of Agriculture for Scotland had decided to lend the Tractor Ditcher to the Ministry of Agriculture for demonstration purposes. The machine was to be removed forthwith, and as the Society's year of control had expired, this would probably terminate their connection with the Ditcher.

Publication of Show Gate Drawings.

The **Secretary** reported that at a Meeting of Stewards, held before the Show, it had been decided that it was undesirable to publish the amount of the drawings at the Gates, and that only the numbers of persons paying for admission should be published. There were obvious objections to the publication of the money takings. The present was a convenient time to make a change, as the increase in the admission charges rendered comparison with drawings at previous Shows of little value.

The action of the Stewards was duly homologated.

Dumfries Show, 1922.

Lieut.-Col. **Carruthers** reported on the steps which had been taken towards securing the fields which were used on the previous occasion as a site for the Dumfries Show in 1922. He suggested that the matter be remitted to a Committee, consisting of the Local Directors and certain co-opted Members, and this was agreed to. The constitution of the Committee, as finally adjusted, was as follows: Lieut.-Col. Carruthers, *Convener*, Mr John M'Caig, Captain R. Macmillan, Mr W. P. Gilmour, Mr James M'Queen, Mr Murray Little, Mr George Will, Major C. R. Dudgeon, Mr Walter Biggar, Mr F. N. M. Gourlay, and Mr William Montgomery.

MEETING OF DIRECTORS, 3RD NOVEMBER 1920.

Mr **David Ferrie** of Parbroath, in the Chair.

Present.—Vice-President—General Archibald Stirling. *Ordinary Directors*—Mr Thomas A. Buttar; Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr David Ferrie; Mr Alexander Forbes; Mr W. P. Gilmour; Mr James Grieve; Mr Thomas Kirk; Mr James R. Lumsden; Sir Kenneth Mackenzie; Mr James M'Laren; Captain Robert Macmillan; Mr James M'Queen; Mr William Meiklem; Colonel John L. Reid; Sir Hugh Shaw Stewart, Bart., C.B.; Major D. A. Spence, V.D.; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr William Carrick; Mr John Edmond; Mr John Elder; Mr John Elliot; Mr Alexander Robertson; Captain James Kemp Smith. *Treasurer*—Sir David Wilson, Bart., D.Sc. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher.

The late Lord Polwarth.

Before proceeding with the business of the Meeting, the **Chairman** made sympathetic reference to the death of the Right Hon. Lord Polwarth, who during his lifetime had taken a great interest in the affairs of the Society, and had occupied the positions of President, Vice-President, and Director.

The late Sir John Gilmour.

The **Chairman** referred in sympathetic terms to the death of Sir John Gilmour of Montrave, Bart., who had filled the offices of Vice-President and Chairman of Directors, and for over eight years occupied the responsible position of Honorary Secretary of the Society.

The late John MacDiarmid.

He also referred to the passing away of Mr John MacDiarmid, who had been connected with the Society during practically the whole of his lifetime, having occupied the position of Chief Clerk for forty-five years. As an official of the Society, he had been held in the highest esteem alike by Directors, Members, and Exhibitors.

The late William Simpson.

The **Chairman** further referred to the death of Mr William Simpson, who for over forty-one years acted as Caretaker to the Society, and in that position performed his duties in a manner which commanded the respect of the Directors and all connected with the Society. Mr Simpson would also be remembered as one of the originators of the Highland Reel and Strathspey Society, and the organiser of the first Concert for Attendants at the Annual Show, which Concerts had become an established feature of that event.

Appropriate resolutions of regret and sympathy were submitted and approved, the members present upstanding, and the Secretary was instructed to forward copies to the relatives of the deceased.

Chairman of the Board for 1920-1921.

On the motion of Mr CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Mr David Ferrie of Parbroath was unanimously re-elected Chairman of the Board for the ensuing year.

Mr FERRIE thanked the Directors for the honour they had done him, and expressed his appreciation of the loyal support which he had received from the Directors and the Society's Staff during his year of office.

Honorary Secretary.

The CHAIRMAN intimated that a letter had been received from Mr Alexander Cross of Knockdon definitely resigning the offices which he held in connection with the Society, as there was no prospect of his being able to attend meetings of the Directors in the future.

On the motion of the CHAIRMAN, it was unanimously agreed to nominate Mr Charles Douglas, D.Sc., C.B., of Auchlochan, for election as Honorary Secretary of the Society at the General Meeting of members in January.

Mr DOUGLAS expressed his thanks for the honour which the Directors had done him in nominating him to that position.

It was unanimously resolved that a letter be sent to Mr Cross expressing the profound regret with which the Directors had received his resignation, and their gratitude for all the valuable services he had rendered to the Board and to the Society.

Representatives on other Bodies.

The following were appointed representatives of the Society on the Boards of the undernoted institutions for the ensuing year—viz.: *Board of Scientific Societies*—Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow. *Edinburgh and East of Scotland College of Agriculture*—John Stirton, Secretary, Highland and Agricultural Society. *Royal (Dick) Veterinary College*—Sir Archibald Buchan Hepburn of Smeaton, Bart. *Glasgow Veterinary College*—James R. Lumsden of Arden, Dumbartonshire. *Scottish Milk Records Association*—John M'Caig of Belmont, Stranraer; Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart.; Major D. A. Spence of Conveth Mains, Dunninald Mains, Montrose.

The appointment of representatives on the Governing Bodies of the West of Scotland Agricultural College and the Aberdeen and North of Scotland College of Agriculture was postponed until next meeting.

Vacancy on Board.

It was agreed to remit to the three Ordinary Directors for the Inverness Division to bring forward, at next meeting, the name of a Director to fill the place of the late Mr John C. Robertson, Fodderty.

Aberdeen Show, 1920.

Accounts.—An Abstract of the Accounts of the Aberdeen Show was submitted, showing a probable credit balance of about £1500.

List of Awards.—The List of Awards was laid on the table.

Stirling Show, 1921.

Date of Show.—On the recommendation of the Shows Committee, the date of the Stirling Show was fixed for the 26th, 27th, 28th, and 29th July 1921.

Forage.—The Secretary was instructed to advertise for tenders for the supply of forage. The following Committee was appointed to consider the tenders and report to the Board: Mr Hugh Martin, *Convener*, Mr William Carrick, Mr John Edmond, Mr David Ferrie, Mr Alexander Forbes, Mr John M'Caig, Mr James M'Laren, Mr Alex. Robertson, and Mr P. O. Turnbull.

Hotel Accommodation and Catering in Showyard.—It was remitted to the Chairman of the Board, the Chairman of the Shows Committee, the Convener of the Local Committee, the Steward of Catering (if and when appointed), and the Secretary to make the necessary arrangements.

Forestry Exhibition.—It was agreed that space in the showyard for a Forestry Exhibition, and a grant of £20 towards prizes for exhibits, be granted to the Royal Scottish Arboricultural Society, on the same conditions as formerly.

Prize List.—The Secretary stated that the Shows Committee had met on 2nd November, and had revised the Premium List and Regulations for the Stirling Show.

It was proposed that as usual their report be printed and issued for consideration in detail at next meeting of the Board.

The Board approved of this course.

Special Prizes.—The following special prizes were accepted, and votes of thanks accorded to the donors:—

(1) Mr William Duthie, Collynie—Perpetual Challenge Cup for the best animal in the Shorthorn Classes. (The conditions of award, &c., to be adjusted later.)

(2) Mr Adam Smith of Lochlands, Larbert—Silver Cup, value £25, for the three best animals in the British Friesian Classes got by the same sire, and exhibited by, but not necessarily bred by, one exhibitor.

(3) Aberdeen-Angus Cattle Society—Champion Gold Medal, value £10, for the best animal in the breeding classes—breeding animals shown as "Extra Stock" being eligible to compete.

(4) The Clydesdale Horse Society—Cawdor Challenge Cup for the best Clydesdale Mare or Filly, on the usual conditions.

(5) The Hackney Horse Society—Champion Prize of £10 for the best Hackney Mare, on the same conditions as formerly.

(6) Shetland Ponies—£10 in prizes of £5, £3, and £2, by "Four Lovers of the Breed," per Mr W. Mungall of Transy, on same conditions as formerly.

(7) The Shetland Pony Stud-Book Society—Silver Medal for the best Shetland Pony, on the same conditions as formerly.

(8) The Border Leicester Sheep Society—Two Gold Medals for best Male and best Female of the breed exhibited in the ordinary classes—animals entered as "Extra Stock" not eligible.

An offer by Mrs Mary Macdonald, Garrochty, of £6 in prizes for Anglo-Nubian Female Goats, and a Challenge Cup to be awarded only when there were exhibits from England and an English judge officiated, was declined, as the Directors could not see their way to agree to the conditions attached to the award of the Cup.

Implements.

A Minute of Meeting of Implements Committee, dated 2nd November, was submitted and approved.

The minute reported the award of the Society's Silver Medal to three Exhibitors of New Implements at Aberdeen Show.

Science.

A Minute of Meeting of Science Committee, dated 3rd November, was submitted and approved.

The Minute recommended—

Grass Sickness Investigation.—That the investigation into this disease be continued for another year, and that expenditure, up to a sum of £850, be authorised for the year, on the following conditions—viz., that contributions from Local Societies, of not less amount than £100, are received; that a grant be obtained from the Board of Agriculture for Scotland equal to the amount contributed by the Highland and Agricultural Society and the Local Agricultural Societies; and that a whole-time Investigator be engaged on the work, under the direction of Dr Tocher, during the ensuing year.

On the suggestion of Sir David Wilson, Convener of the Science Committee, Dr Tocher explained briefly the nature of the investigations carried out during the past eighteen months, the conclusions which had been arrived at, and the steps being taken to produce a suitable anti-toxin. Dr Tocher undertook to circulate amongst Members of the Board copies of the Report on the Inquiry so far as it had gone.

Deficient Samples.

Dr J. F. Tocher, Consulting Chemist to the Society, submitted a Report on samples of manures and feeding-stuffs analysed by him for members during the past four months.

Fertilisers and Feeding-Stuffs Act.

A letter was submitted from Dr Tocher enclosing copy of a draft of a proposed Bill to amend the Fertilisers and Feeding-Stuffs Act drawn up by him for the Association of Public Analysts of Scotland.

Dr TOCHER said the Members of the Association of Public Analysts had given this matter very close and careful consideration, in consultation with other experts, and this was a draft of the Bill which they desired should be discussed, not only by the Highland and Agricultural Society but by all interested in Agriculture. He hoped they would remit the matter to the Science Committee, and he would do his best to explain to that Committee the various clauses of the Bill.

SIR DAVID WILSON moved that the Draft Bill be remitted to the Science Committee for consideration and report, and this was agreed to.

Show of 1924.

A letter was submitted from the Town Council of Perth inviting the Society to hold the annual Show in Perth in 1924, and offering to place every facility at the disposal of the Society, including a supply of water, gas, and electricity.

The CHAIRMAN said he was sure they all appreciated very highly this offer from the city of Perth. It was too soon to arrive at a decision as to the site of the Show of 1924, but when the matter came to be decided he was sure this invitation would receive favourable consideration.

National Diploma in Dairying.

Reports on the examinations for the National Diploma in Dairying, held at Reading and Kilmarnock in the end of September, were laid on the table.

Demurrage on Railway Sacks.

Correspondence was submitted which had passed between the United East Lothian Agricultural Society and the Ministry of Transport and the North British Railway Company, from which it appeared that farmers had been charged demurrage for railway sacks in cases where the Railway Company declined to accept sacks owing to stations having been closed for traffic, even though these stations were open for traffic when the sacks were applied for. As, however, the particular claim on which the question had arisen had been adjusted, the correspondence was submitted merely for information.

Area Transport Commissioner.

A communication was submitted from the Minister of Transport, notifying the appointment of Mr W. M. M'William, 5 Drumsheugh Gardens, Edinburgh, as Area Transport Commissioner for Scotland.

Dumfries Show, 1922.

Lieut.-Colonel F. J. CARRUTHERS, Convener, reported that the Special Site Committee recommended that an agreement be entered into with Mr William Johnston, Dumfries, for the use of two fields on Rotchell Estate as a site for the Dumfries Show in 1922, at a rental of £300.

Finance.

A Minute of Meeting of Committee, dated 3rd November, was submitted and approved.

The Minute recommended—

(1) *Glasgow Veterinary College.*—That the proposed grant of £800 to the Glasgow Veterinary College be confirmed, as the required assurance had now been obtained from the Board of Agriculture for Scotland that the College would be maintained as a Teaching Institution.

(2) *Animals Diseases Research Association.*—That a grant of £1000 be given to the funds of the Animal Diseases Research Association.

(3) *Mrs Brock's Bequest.*—Intimation had been received from Messrs D. & J. Hill, Writers, Glasgow, to the effect that Mrs Mary Brock of Treesbank, Stewarton Drive, Cambuslang, had bequeathed to the Society a legacy of £500, free of legacy duty.

MEETING OF DIRECTORS, 1st December 1920.

Mr David Ferrie of Parbroath, in the Chair.

Present.—Vice-President—Mr John James Moubray. *Ordinary Directors*—Mr Thomas A. Buttar; Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr W. A. Dron; Mr James Durno; Mr David Ferrie; Mr Alexander Forbes; Mr W. P. Gilmour; Mr James Grieve; Mr J. E. Kerr; Mr James R. Lumsden; Mr James M'Laren; Mr J. T. M'Laren; Mr James M'Queen; Mr H. B. Marshall; Mr William Meiklem; Mr R. A. Smith; Major D. A. Spence, V.D.; Mr John Spier; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Colonel Edwin Bolton; Mr William Carrick; Mr John Edmund; Provost M'Culloch; Mr Hugh Martin; Mr Robert Paterson; Mr Alexander Robertson; Mr J. L. Wilson. *Treasurer*—Sir David Wilson, Bart., D.Sc. *Consulting Engineer*—Professor R. Stanfield.

School Children and Potato-Lifting.

A letter was submitted from Mr F. W. Christie, Secretary of the Fife Branch of the National Farmers' Union, requesting the sanction of the Directors to the appointment of Mr David Ferrie and Mr R. D. Thom as members of a deputation being organised by the Union to attend a Conference with the Fife Education Authority, with a view to securing a three weeks' holiday for school children during the potato-lifting season.

It was agreed that there was no objection to these gentlemen taking part in the proposed Conference, so long as it was clearly understood that they could only represent their individual views on the subject, and not the views of the Board.

Vacancy on the Board.

On behalf of the ordinary Directors in the Inverness Division, Mr R. A. Smith, Wester Lovat, moved that Mr A. B. Leitch, Inchstellie, Alves, Forres, be nominated as an ordinary Director to fill the vacancy caused through the death of the late Mr John C. Robertson. This was unanimously agreed to.

Representatives on other Bodies.

The following were appointed representatives of the Society on the Boards of the undernoted institutions for the ensuing year:—

West of Scotland Agricultural College.—Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart.; Mr John M'Caig of Belmont, Stranraer.

Aberdeen and North of Scotland College of Agriculture.—Mr William Duthie, Collynie, Tarves; Dr J. F. Tocher, 41½ Union Street, Aberdeen.

Royal (Dick) Veterinary College.—A letter was submitted from Sir Archibald Buchan Hepburn of Smeaton, Bart., regretting that he was unable to accept reappointment as the Society's representative on the Board of the Royal (Dick) Veterinary College. Mr Thomas Kirk of Abbey Mains, Haddington, was appointed to represent the Society on the Governing Board of this College.

Stirling Show, 1921.

Prize List.—A Report of the Shows Committee of 2nd November, which had been printed and circulated, was submitted.

Some discussion followed with regard to the recommendation in the Report that it be remitted to the Stewards to consider and report as to the desirability of conducting part of the judging on the afternoon of the first day of the Show, but it was ultimately agreed to postpone decision until the report of the Stewards was received.

On the motion of Mr James M'Laren, Cornton, the Report was then approved.

Shows Committee Minute.—A Minute of Meeting of Shows Committee, dated 1st December, was submitted and approved.

The Minute recommended:—

Veterinary Examination of Horses.—That Mr Ernest Kerr of Harviestoun be appointed a member of the Sub-Committee to redraft Rule No. 39, in place of Mr John M'Caig, who was unable to act through illness.

Derby Competition.—That facilities be granted the Stirling Agricultural Society for the judging of their Derby Competition, on the same conditions as at Paisley.

Harness Classes.—That a suggestion by Mr William S. Miller, Balmanno Castle, Bridge of Earn, that the Society increase the Prize Money in the Driving Classes by £100, be agreed to, and that his offer to raise this amount be accepted with thanks; and that it be remitted to the Convener of the Shows Committee, along with Mr Ernest Kerr and Mr Moffat S. Thomson, to consult with Mr Miller and adjust the Classes.

Convener of Local Committee.—On the motion of Sir David Wilson, Bart., seconded by Mr Alexander Robertson, Brig.-General Archibald Stirling of Keir was unanimously appointed Convener of the Local Committee of Management.

Appointment of Judges.—The Secretary reported that, at a meeting of the Board in Committee on 30th November, Judges had been appointed for the various classes of Stock. These gentlemen had been communicated with, and after replies were received the list of Judges would be published in the Press.

British Women's Temperance Association.—A letter was submitted from the President of the Stirling Branch of the British Women's Temperance Association, and it was agreed to grant the usual free site for a refreshment stand at the Show.

Special Prizes.—The following special prizes were accepted, and votes of thanks accorded to the donors:—

(1) *Galloway Cattle Society*—Dr Gillespie Memorial Challenge Trophy, on the same conditions as at Aberdeen.
(2) *Ayrshire Cattle Herd-Book Society*—£20 to provide two prizes of £10 each for the best male and female of the Ayrshire breed, entered with a number in the Herd-Book not later than 1st June 1921.
(3) *Board of Agriculture for Scotland*—£30 for the class for Ayrshire Bulls, any age, the progeny of Ayrshire Cows having authenticated milk yields. £40 towards the prizes in the Highland Pony Classes.
(4) *The Hunters' Improvement, &c., Society*—Champion Gold Medal for the best Hunter Filly (not exceeding 3 years old) registered with a number in the Hunter Stud-Book.
(5) *Cheviot Sheep Society*—Perpetual Challenge Cup, value £25, gifted by Mr J. Borthwick for best sheep in the Cheviot Classes.
(6) *Suffolk Sheep Society*—£25 in prizes as follows: Suffolk Ram Lambs, £10; three Suffolk Ewe Lambs, £8, £5, and £2, as at Aberdeen.
(7) *Mrs Macdonald*—Challenge Cup, value £10, for best Female Anglo-Nubian Goat, entered in A.N. Section of the Herd-Book; over two years old, in milk.
(8) *Large Black Pig Society*—£24 towards the prizes in the Large Black Pig Classes.

Science.

A Minute of Meeting of Science Committee, dated 1st December, was submitted and approved.

The Minute recommended that the Draft Fertilisers and Feeding-Stuffs Bill, prepared by Dr Tocher for the Association of Public Analysts of Scotland, be remitted to the following Sub-Committee, with power to consult representatives of the trade and others, and to prepare a report to be submitted in the first instance to the Science Committee—Sir David Wilson, Bart., *Convener;* Mr David Ferrie; Mr Charles Douglas, D.Sc., C.B.; Mr P. O. Turnbull, and Dr Tocher.

"*Buckeye*" *Tractor Ditcher.*

A statement of income and expenditure in connection with the working of the Buckeye Tractor Ditcher, covering the period from 5th May 1919 to 9th August 1920 was submitted, together with notes thereon by the Implements Committee, dated 30th November.

The statement showed that there was a deficit on the year's working of £521, 4s. 1d., which sum fell to be refunded to the Society by the Board of Agriculture for Scotland in accordance with agreement. During the period 2748½ chains had been dug, at charges varying from 3s. to 6s. per chain. To have made income meet expenditure, the charge per chain would require to have been 6s. all over; or, if a sum of £280 was allowed for depreciation on the machine, 8s. per chain.

Grants to Local Societies.

The following Report by the Shows Committee, dated 1st December, relating to Grants to Local Societies, was submitted and approved.

The Committee recommended thirteen districts for grants of £12 each; nineteen districts for three Silver Medals each; twelve districts for grants of £15 each for Stallions, special grants of £40 for Highland Home Industries, £50 for Women's Rural Institutes, £20 to Kilmarnock Cheese Show, £3 each to Orkney, Sanday (Orkney), East Mainland, and West Mainland (Orkney); a Gold Medal and a Silver Medal to the British Dairymaids' Association, a Gold Medal and a Silver Medal to the Fife Agricultural Society, eighteen districts for two Medals each, the usual Medals at Ploughing and Hoeing Competitions, and five districts for two Medals each for Cottages and Gardens, Long Service Medals and Certificates, say £112—making the total sum offered in 1921 £757, against £670 awarded in 1920

Animal Diseases Research Association.

The decision arrived at at last Meeting, to recommend that a grant of £1000 be given to the funds of the Animal Diseases Research Association, was confirmed, in terms of the Charter

Entertainments Tax

The SECRETARY submitted correspondence he had had with the Secretary of the Royal Lancashire Agricultural Society with regard to a movement to obtain for Agricultural Shows complete exemption from Entertainments Tax A Conference of representatives of Agricultural Societies was to be held in London on 9th December, with a view to steps being taken to approach the Chancellor of the Exchequer on the subject. It was agreed that the Secretary be appointed to represent the Society at the Conference, provided that the Royal Agricultural Society was also to be represented

Valuation of Unexhausted Manures and Feeding Stuffs

A letter from Professor James Hendrick, dated 10th November, was submitted, in which the suggestion was made that Scale C, in the Report of the Scottish Committee issued in 1917, should be recalculated and issued annually by the Society It was agreed to remit the letter to the Science Committee for consideration and report.

Finance

The following Minute of Meeting of Finance Committee, dated 1st December, was submitted and approved

The Minute recommended (1) that Mrs Simpson's retiring allowance be increased from £20 to £30 per annum, (2) that Mr Andrew Brown's salary as Caretaker be increased from £140 to £170 per annum.

MEETING OF DIRECTORS, 5TH JANUARY 1921

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—Ordinary Directors—Mr Thomas A. Buttar; Lieut.-Col. F. J. Carruthers, Mr Alexander Cowan, Mr Charles Douglas, D Sc, C B, Mr W. A. Dron; Mr David Ferrie, Mr W. P. Gilmour, Mr James Grieve; Mr Thomas Kirk; Mr James R. Lumsden, Sir Kenneth Mackenzie, Bart, Mr James M'Laren; Mr J T. M'Laren, Mr James M'Queen, Mr William Meiklem; Sir Hugh Shaw Stewart, Bart; Mr R. A. Smith, Major D A Spence, V.D., Mr John Spier, Mr Moffat S. Thomson, Mr Phipps O Turnbull. *Extraordinary Directors*—Mr A. H. Anderson; Mr William Carrick, Mr James Elder, Mr John Elliot; Mr John Fraser; Mr Murray Little; Mr Robert Macdiarmid; Mr Hugh Martin, Mr Robert Park; Mr Alexander Robertson *Treasurer*—Sir David Wilson, Bart., D.Sc. *Consulting Engineer*—Professor R Stanfield. *Auditor*—Mr William Home Cook. *Chemist*—Dr J. F Tocher.

Finance.

A Minute of Meeting of Committee, dated 5th January, was read and approved. The Minute stated (1) that an Abstract of the Accounts for the year 1919 20, as prepared by the Society's Auditor, had been submitted and approved, and signed by two members of the Finance Committee and by the Auditor ; and (2) that the usual estimate of probable Income and Expenditure for the year 1920-21, as prepared by the Secretary, had been submitted.

Stirling Show, 1921.

Stewards.—The Stewards of the various departments were appointed as follows: *Cattle*—Mr J. Ernest Kerr and Mr Moffat S. Thomson; *Horses*—Mr John M'Caig and Mr John P. Sleigh; *Sheep, Goats, Pigs, and Wool*—Captain R. Macmillan and Mr John Elliot; *Grand Stands*—Lieut.-Colonel John L. Reid and Captain Thomas Kirk; *Forage*—Mr Hugh Martin and Mr Robert Park; *Gates*—Mr Alexander Forbes and Mr James M'Queen; *Implements*—Mr P. O. Turnbull and Mr John Spier; *Poultry, Bees, Honey, and Catering*—Mr James R. Lumsden.

Veterinary Surgeon.—On the motion of Mr JAMES M'LAREN, Cornton, Mr John MacFarlane, M.R.C.V.S., Doune, was unanimously appointed Veterinary Inspector for the Stirling Show on the usual conditions.

Gloucestershire Old Spots Pigs.—A letter was submitted from the Secretary of the Gloucestershire Old Spots Pigs Society, confirming the offer of £15 towards the prizes for these classes, and a 40-Guinea Silver Challenge Trophy for the best G.O.S. pig shown. It was agreed that this offer be accepted with thanks.

Mr James Peter, Old Vicarage, Berkeley, Glos., was appointed Judge of G.O.S. Pigs.

A suggestion that the younger classes for boars and gilts should be selling classes was considered, but it was decided that the proposal should not be adopted.

Cumberland Pigs.—A letter was submitted from the Secretary of the Cumberland Pig-Breeders' Association, requesting the Society to institute four classes for Cumberland Pigs, with a total prize money of £48, and offering, if this is done, to contribute £24 towards the prizes. It was decided that the proposed classes be provided, and that the offer of the Breed Society be accepted with thanks

Mr J. H. Toppin, Musgrave Hall, Penrith, was appointed Judge of Cumberland Pigs.

Applications for Stands.—Applications for a free stand from the Central Area Committee of the *Scottish Women's Rural Institutes*, and for permission to erect a luncheon tent from the *Stirling County Club and Royal Golf Club, Perth*, were remitted to the Shows Committee for consideration and report.

It was agreed that the free stand granted to the *West of Scotland Agricultural College* have a frontage of 100 feet; and that the usual free stand be granted to the *Co-operative Council of Highland Home Industries.*

Hotel Accommodation.—The SECRETARY reported that the necessary hotel accommodation for Directors and Judges had been secured in the Dunblane Hydropathic and the Allan Water Hotel, Bridge of Allan.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

(1) *The British Friesian Cattle Society*—£53 towards the prizes in the British Friesian Classes, together with two Champion Prizes of £5 each for the best Female and for the best Male exhibited.

(2) *The National Pony Society*—Special Prize of £15 for the best Highland or Western Island Stallion or Mare entered or accepted for entry in the Highland Section of the National Pony Stud-Book. Competition to be strictly confined to animals passed sound and free from hereditary disease.

(3) *Oxford Down Sheep-Breeders' Association*—Contribution of £21 towards the prizes in the Oxford Down Classes on the same conditions as formerly.

(4) *National Pig-Breeders' Association*—Gold Medal, value £5, for the best Large White Boar; and Gold Medal, value £5, for the best Large White Sow.

(5) *National Pig-Breeders' Association*—Gold Medal, value £5, for the best Middle White Boar; and Gold Medal, value £5, for the best Middle White Sow.

Show of 1923.

Sir KENNETH MACKENZIE of Gairloch, Bart., moved—

> "That provided a suitable site is available, and satisfactory financial and other arrangements can be made, the Society's Show of 1923 be held in the Inverness district."

The motion was seconded by Mr R. A. SMITH, Wester Lovat, and unanimously agreed to.

Science.

Grass Sickness Investigation.

A Minute of Meeting of Science Committee, dated 5th January, was submitted and approved. The Minute was in the following terms:—

A letter was submitted from the Board of Agriculture for Scotland, dated 30th December, in which it was stated that it appeared to the Board that a continuation of the Investigation into the causes of the disease of horses known as "Grass Sickness" was a matter which might be considered as falling within the scope of the Joint-Committee of the Association for Research into Animal Diseases, and inquiring whether it would not be possible to postpone further investigation until the Association was in a position to proceed with it.

The Committee decided to recommend that a reply be sent to the Board that the Directors agree with the view that any future investigations into Animal Diseases may properly be referred to the Joint-Committee which they indicate; but, in the interests of continuity of the present investigation, and in view of the necessity for immediate action, the Directors think that this investigation should be completed by the present investigators entrusted by the Societies with the research. The Directors should further point out that this investigation will be completed within the current year, and that steps must be taken immediately to make the necessary arrangements. Should the Board of Agriculture have difficulty in accepting the above view, the Directors will be obliged if the Board will receive the following deputation, which it is suggested should be appointed to meet them—Sir David Wilson, Mr David Ferrie, Mr Charles Douglas, D.Sc., C.B., and Dr J. F. Tocher.

Long Service Certificates and Medals.

A letter from Mr William Elliot, Lanark, dated 16th December, making various suggestions with regard to the Society's Long Service Certificates and Medals, was remitted to the Shows Committee for consideration and report.

New Members.

The SECRETARY intimated that there were 423 candidates for election as members of the Society at the Anniversary General Meeting to be held that afternoon.

Finance.

The remaining part of the Minute of Meeting of 5th January was submitted and approved.

The Minute stated that the Secretary had reported that notice of assessment had been received for Income Tax on the profits of the Edinburgh Show, and that, in accordance with instructions received at the Meeting of Directors in February last, he had communicated with the Society's Law Agents, who had lodged an appeal to the Income Tax Commissioners. It was agreed that the Society be represented before the Commissioners by the Law Agents and the Secretary, and that a decision as to future action be postponed until the result of the appeal was known.

'Transactions.'

A Minute of Meeting of Publications Committee, dated 5th January, was submitted and approved.

The Minute recommended payments to writers of articles in the volume of 'Transactions' for 1920 amounting to £152, 13s.

Entry of New Zealand Stock at Show.

With regard to the question of stock from New Zealand being allowed to compete at the Show, which question was raised in a letter from the Veterinary Officer of the High Commissioner's Office, London, the SECRETARY reported that he had now ascertained that the Royal Agricultural Society had decided against the admission of these cattle.

On the motion of Mr THOMAS KIRK, seconded by Mr THOMAS A. BUTTAR, it was decided to follow the action taken by the Royal Agricultural Society, and the Secretary was instructed to reply that these cattle could not be admitted.

Entertainments Tax.

The SECRETARY reported that, as authorised at the Meeting in December, he had attended a Conference in London of representatives of Agricultural Societies with reference to the question of obtaining a general exemption from Entertainments Tax of all Agricultural Shows. The decision arrived at at the Conference was that the opinion of Counsel should be obtained as to the liability of Agricultural Shows to Entertainments Tax, and that thereafter a deputation should wait on the Chancellor of the Exchequer with a view to obtaining exemption.

After discussion, it was decided, in view of the fact that the Society had been represented at the Conference at which this decision was taken, that the Society do not decline liability for its share of the expense of obtaining Counsel's opinion; but, in view of the immunity of the Society's Show from Entertainments Tax, no part be taken in the proposed deputation to the Chancellor of the Exchequer. The question of any future action by the Society would be considered by the Directors when the occasion arose.

MEETING OF DIRECTORS, 2ND FEBRUARY 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present. — *Vice-President* — Mr John James Moubray. *Ordinary Directors*— Mr Thomas A. Buttar; Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr David Ferrie; Mr Alexander Forbes; Mr James Grieve; Mr J. E. Kerr; Mr Thomas Kirk; Mr James R. Lumsden; Mr James M'Laren; Mr James M'Queen; Mr Robert Macmillan; Mr William Meiklem; Colonel J. L. Reid; Mr John Spier; Mr Moffat S. Thomson; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr A. H. Anderson; Mr William Carrick; Mr John Edmond; Mr John Elder; Mr John Elliot; Mr W. Watson Murray; Mr Robert Paterson; Mr Robert Park; Mr Alexander Robertson; Mr James Kemp Smith. *Treasurer*—Sir David Wilson, Bart., D.Sc. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher.

Science.

A Minute of Meeting of Committee, dated 2nd February, was submitted and approved.

The Minute dealt with the following matters:—

Schedule of Unit Values.—The Schedule of Unit Prices of Manures and Feeding-Stuffs for the current year had been revised, and it was recommended that it be printed and issued as usual.

Mineral Phosphates Investigation.—Dr Tocher had submitted a short Report summarising the results of the laboratory and field experiments on Mineral Phosphates, and had been requested to prepare a paper dealing with the Investigation, which would be available for publication in the current volume of 'Transactions.'

Unexhausted Manurial Values.—The Committee, in accordance with the remit from the Board, had considered the Report on Unexhausted Manurial Values and "Cumulative Fertility," issued by the Scottish Committee in 1917. The Committee recommended the Directors to approve of the Report, at the same time directing attention to the fact that the situation regarding Cumulative Fertility had been affected by the passing of the Agriculture Act, 1920. It was further recommended that Table C of the Report be revised annually, as at the date of the February Meeting of the Board, and published in the same way as the Schedule of Unit Values.

"Grass Sickness" Investigation.—In connection with the application for a grant of £500 towards the expenses of the Investigation, a letter had been received from the Board of Agriculture for Scotland, requesting a detailed estimate of the expenditure and income likely to be involved for the current year. The Secretary reported that he had been in communication with the Perthshire Agricultural Society and the Angus Agricultural Association, both of which bodies had intimated

their intention to contribute £50 towards the expenses for the current year. A draft estimate of income and expenditure was submitted, and it was recommended that the Directors approve of it for transmission to the Board of Agriculture.

Stirling Show, 1921.

Prize List and Regulations, &c.—A Minute of Meeting of Shows Committee, dated 2nd February, was submitted and approved. The Minute was in the following terms:—

Harness Classes.—Mr J. Ernest Kerr submitted a classification for Harness Classes which had been adjusted with Mr Miller, Balmanno Castle, Bridge of Earn. This classification showed a total prize money of £157, of which £110 would be contributed by Mr Miller, and £47 by the Society. It was further agreed that the thanks of the Society be accorded to Mr Miller for his generous contribution.

Berkshire Pig-Breeders' Association.—An offer was submitted from the British Berkshire Society of a Champion Prize of £10, on condition that the judge of Berkshires should be selected from the list of recommended judges. After discussion it was agreed to point out to the Berkshire Society that a judge (Mr Edmund Wherry) had already been appointed to act both for Middle Whites and Berkshires, and that no alteration could be made for the present year.

Rule 39.—The following draft of Rule 39, prepared by the Sub-Committee, was submitted and approved:—

> "Rule 39, no Stallion or Entire Colt, two years old or upwards, shall be allowed to compete for any of the Society's prizes unless it has previously been licensed for stud purposes during the current year by the Board of Agriculture for Scotland, the Ministry of Agriculture and Fisheries, or the Irish Department of Agriculture."

Showyard Contract Committee.—It was agreed that the following Sub-Committee be appointed to deal with matters of detail relating to the Showyard contracts: Mr D. Ferrie, Brig.-General Archibald Stirling of Keir, Mr James M'Laren, Mr Alexander Robertson, Mr John Edmond, Professor R. Stanfield.

The Secretary was authorised to advertise for tenders for timber on the same lines as last year.

Show Site.—Agreements were submitted which had been entered into with the Department of Woods and Forests and with Mr John W. Dewar, King's Park, Stirling, for the use of the Showground at King's Park.

Mr M'Laren reported on the negotiations which he had had with the Stirling Golf Club as to their claim for compensation for loss of revenue through the holding of the Show. It was agreed that it be left to Mr M'Laren and Mr Alexander Robertson to adjust this claim with the Golf Club.

Royal Scottish Arboricultural Society.—A letter was submitted from the Royal Scottish Arboricultural Society, dated 12th January, in which application was made for the grant of £80 towards the expenses of their annual Exhibition and Plantations Competitions, this grant to be in addition to the £20 which the Society at present gives for prizes for timber. It was agreed that further information be asked with regard to the deficit on the Exhibition at Aberdeen, and on the Plantations Competitions last year, and for a statement as to how the proposed grant would be expended for the coming year.

The following applications for free stands, &c., were submitted:—

Scottish Women's Rural Institute.—Granted 40 feet.

National Farmers' Union.—Granted free site.

Union of South Africa.—A request for permission to erect a marquee, covering 8000 square feet, was considered, but it was decided that permission be not granted, as the necessary space was not available.

Long Service.—A letter from Mr William Elliot, Lanark, with regard to Long Service Awards, was submitted, and it was agreed to remit it to the following Sub-Committee for consideration and report—The Chairman, Honorary Secretary, Treasurer, Mr James M'Laren, Mr Thomas Kirk, Mr T. A. Buttar, and Mr P. O. Turnbull, with power to confer with Mr Elliot if thought desirable.

Forage.—A Minute of Meeting of Forage Committee, dated 1st February, was submitted and approved.

The Minute recommended that it be agreed to appoint the Forage Supply Company to carry out the contract.

Hours of Judging.—The following Minute of Meeting of Stewards, dated 1st February, was submitted and approved.

The Minute recommended that, on the present occasion, Shetland Ponies and Highland and Western Island Ponies be judged at 1.30, and Harness Classes at 2.30 P.M. on Tuesday, the opening day of the Show.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

(1) *Shorthorn Society.*—Two Champion Prizes of £20 each, with Silver Medals to the breeders, for best Male and best Female Shorthorns.

(2) *S. R. Sherwood, Playford, Ipswich.*—£10, 10s. in two Special Prizes of £5, 5s. each, for the best Suffolk Ram Lamb, and the best pen of Suffolk Ewe Lambs, bred in Scotland.

Draining Plough.

A letter from the Board of Agriculture for Scotland, dated 28th January, was submitted, together with a Report on the working of a plough used by Mr Thomas Pate, West Browncastle, Strathaven, for the excavation of field drains.

The letter and Report were remitted to the Implements Committee for consideration and Report.

Fair Trading Council.

The CHAIRMAN reported on the work of the Fair Trading Council (Potatoes and Vegetables Section), of which he had attended seven Meetings in London as the representative of the Society. There was now a proposal that these Meetings should cease, and the various representatives had been asked to bring before the bodies which they represented the question whether or not they wished the Meetings of the Council to continue.

After discussion, it was agreed, on the motion of Mr CHARLES DOUGLAS, D.Sc., C.B., that the Directors express the view that the Meetings of the Council should be discontinued.

Committees.

It was decided that Mr A. B. Leitch, Inchstelly, Alves, Forres, who was elected a Director at the General Meeting in January, be appointed a member of the Science and Implements Committees.

MEETING OF DIRECTORS, 2ND MARCH 1921.

Mr DAVID FERRIE of Parbroath, in the Chair.

Present.—*Vice-Presidents*—Earl of Moray; Lord Balfour of Burleigh; General Archibald Stirling. *Ordinary Directors*—Mr Thomas A. Buttar; Lieut.-Col. F. J. Carruthers; Mr Alexander Cowan; Mr Charles Douglas, D.Sc., C.B.; Mr W. A. Dron; Mr James Durno; Mr David Ferrie; Mr James Grieve; Mr J. E. Kerr; Mr Andrew B. Leitch; Mr John M'Caig; Mr James M'Laren; Mr James M'Queen; Mr Robert Macmillan; Colonel J. L. Reid; Sir Hugh Shaw Stewart; Mr Phipps O. Turnbull. *Extraordinary Directors*—Mr A. H. Anderson; Mr John Edmond; Mr John Elder; Mr Hugh Martin; Mr Alexander Robertson; Mr James Kemp Smith; Mr James L. Wilson. *Consulting Engineer*—Professor R. Stanfield. *Chemist*—Dr J. F. Tocher.

Stirling Show, 1921.

A Minute of Meeting of Shows Committee, dated 2nd March, was submitted.

The Minute recommended—

Exhibition of Timber.—That, having considered the application from the Royal Scottish Arboricultural Society, this Society's Grant of £20 for prizes for timber be continued; and that a further grant of £30 be made for the current year, this latter sum to be applied towards the expenses of the Forestry Exhibition within this Society's Showyard, and to be regarded as a special grant for one year only.

Casares Junior Challenge Cup.—That the conditions of this Cup be altered, so as to admit Shorthorn Bulls calved on or after the 20th of April of the year preceding the Show—this amendment to receive the sanction of Mr Casares, junr.

On the motion of Mr T. A. BUTTAR, seconded by Mr JAMES DURNO, it was agreed that the recommendation regarding the Casares Cup be amended so as to admit Shorthorn Bulls calved on or after 1st April, instead of 20th April, in the year preceding the Show.

The Minute of Shows Committee was otherwise approved.

Proof of Prize List.—A proof print of the Prize List and Regulations was submitted and approved.

Special Prizes.—The following Special Prizes were accepted, and votes of thanks accorded to the donors:—

(1) *Duke of Montrose, K.T.*—Champion Bronze Medals for best animal or pen in each section of Live Stock.

(2) *Mr Dugald M'Kechnie, Glasgow.*—Special Prize of £10, 10s. for group of Suffolk Sheep comprising a Ram, a Ewe, a Ram Lamb, and a Ewe Lamb.

(3) *The Baroness Burton.*—£6 in prizes of £3, £2, and £1 for Female Goats in Milk, confined to Scottish Exhibitors.

Dumfries Show, 1922.

The fixing of the date of the Dumfries Show, 1922, was considered. After some discussion it was agreed, on the suggestion of the CHAIRMAN, to delay further consideration until next meeting.

Draining Plough.

A Minute of Meeting of Implements Committee, dated 2nd March, was submitted and approved.

The Minute recommended that representatives of the Implements Committee should visit West Browncastle, Strathaven, and inspect at work the Draining Plough invented by Mr Thomas Pate; and that it be remitted to the following Sub-Committee to draw up a Report for consideration at next meeting—Mr P. O. Turnbull, Mr David Ferrie, Mr Charles Douglas, D.Sc., C.B., Mr James M'Laren, Mr John Spier, and Professor Stanfield.

Dangerous Drugs Act, 1920.

The SECRETARY stated that the attention of the Society had been drawn by the North British Branch of the Pharmaceutical Society of Great Britain to the proposed Regulations which had been prepared under the Dangerous Drugs Act, 1920. He had consulted with the Chairman and the Convener of the Science Committee, and, at their request, had communicated with Dr Tocher, who had been good enough to suggest a series of representations which he had submitted to a Sub-Committee of the Science Committee, and thereafter forwarded to the Home Office on the 12th of February. The representations were as follows:—

1. The Highland and Agricultural Society of Scotland, having considered the Draft Regulations under the Dangerous Drugs Act, 1920, is of opinion that they will very seriously affect the existing arrangements under which stock farmers keep in their possession, for use in emergencies, and also as recognised remedies at all times, many preparations into which the drugs included under the Act, and particularly Opium and its preparations, enter.
2. The Regulations do not clearly provide for farmers and others being enabled to obtain remedies prescribed by veterinary surgeons, or by others, such as farriers, who are skilled in the treatment of animals though not registered veterinary surgeons, nor do they permit the administration of any remedies by farmers themselves or by farriers.
3. The Society has no objections to Regulations being framed to protect the public in large cities, and particularly in the London area, but the Regulations as drafted are needlessly burdensome and impracticable so far as the rearing and treatment of horses, cattle, and sheep in Scotland are concerned. The Society suggests that the Home Office should reconsider and redraft the Regulations after an inquiry and consultation with parties interested.

A copy of the representations had also been sent to the Secretary for Scotland, who replied, on 14th February, that the Home Secretary informed him that, while the period of publication of the Draft Regulations expired on 16th February, the Draft Regulations did not come into operation actually until they had been formally made. They had been issued as Draft Regulations, in conformity with the provisions of the Rules Publication Act, 1893, in order that bodies and persons interested might have an opportunity of making representations if they desired to do so; and before the Regulations were finally made, such representations as had been received by the Home Secretary would be carefully considered.

The Secretary further reported that he had received a letter, dated 17th February, from the Secretary of the North British Branch of the Pharmaceutical Society, in which he said: "With your valuable help, we think we have succeeded in stopping those crude and ill-considered Regulations, which would have been in force to-day, with all their penalties, had prompt action not been taken. Now, we shall have to see that something more sensible is done."

Lord Balfour of Burleigh, Vice-President of the Society, said he had been watching this matter, and he had had a considerable number of communications from various sources, in much the same sense as the representations read. He understood that the Regulations were being redrafted, and if, when the Regulations reappeared, the agricultural bodies, or others interested, asked him to make any representations or to look after their interests, he would be most happy to do so.

Dr **Tocher** stated that the Draft Regulations appeared to him to be wholly unworkable, and not capable of amendment. There should be a new set of Regulations, and these Regulations should be framed in consultation with the British Medical Association, the Pharmaceutical Society, the leading Agricultural bodies, and the Veterinary Profession.

The **Chairman** thanked Lord Balfour for his kindly offer of assistance, of which he was sure the Directors would be glad to avail themselves.

Importation of Canadian Cattle.

A letter was submitted from the Corporation of London, dated 27th January, inviting the Society to appoint representatives to attend a Conference on the above subject on the 9th of March.

A letter was also submitted from the Royal Agricultural Society of England, intimating that that Society had decided not to send representatives to the Conference.

Mr T. A. **Buttar** moved that the Society do not send representatives to the Conference, and this was seconded by Colonel **John L. Reid**.

Mr **John Edmond** moved, as an amendment, that a representative, or representatives, be sent.

As the amendment was not seconded, Mr Buttar's motion became the finding of the Meeting.

Seeds Act, 1920.

A letter was submitted from the Board of Agriculture for Scotland, dated 23rd February, enclosing copies of the Draft Regulations which had been prepared under the Seeds Act, 1920, and inviting the Society to appoint a representative to attend a Conference on 4th March, for the purpose of discussing the Draft Regulations.

On the motion of the **Chairman**, Mr James Elder, Athelstaneford Mains, Drem, was appointed to represent the Society at the Conference.

District Agricultural Wages Committees.

Communications from the Board of Agriculture for Scotland regarding the constitution of the new District Agricultural Wages Committees were submitted, and representatives of the Society in the districts of the various Committees were appointed.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 2ND JUNE 1920.

Sir DAVID WILSON of Carbeth, Bart., in the Chair.

New Members.

Six hundred and ninety-seven candidates were balloted for and admitted Members of the Society.

Election of Office-Bearers.

The following noblemen and gentlemen were elected office-bearers of the Society for the year 1920-21:—

President—Duke of Montrose, K.T., Buchanan Castle, Drymen.

Vice-Presidents—Earl of Moray, Kinfauns Castle, Perth; General Archibald Stirling of Keir, Dunblane; Lord Balfour of Burleigh, K.T., Kennet, Alloa; Mr J. J. Moubray of Naemoor, Rumbling Bridge.

Ordinary Directors—1917: Mr W. A. Dron, Crieffvechter, Crieff; Mr John M'Caig of Belmont, Stranraer; Lord Forteviot, Dupplin Castle, Perth; Mr Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow; Mr Moffat S. Thomson of Lambden, Spotsmains, Kelso; Mr Alexander Cowan, Valleyfield, Penicuik; Mr Alexander Forbes, Rettie, Banff.

1918.--Captain Robert Macmillan of Holm of Dalquhairn, Woodlea, Moniaive; Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Place, Edinburgh; Mr David Ferrie of Parbroath, Cupar-Fife; Mr William Donald, Fardalehill, Kilmarnock; Mr Robert Dickinson, Longcroft, Oxton; Mr Phipps O. Turnbull, Smeaton, Dalkeith; Colonel J. L. Reid of Cromley Bank, Ellon; Mr J. Ernest Kerr of Harviestoun Castle, Dollar.

1919.—Mr R. A. Smith, Wester Lovat, Beauly; Mr William Meiklem, Begg, Kirkcaldy; Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock; Mr H. B. Marshall of Rachan, Broughton; Mr Thomas Kirk of Abbey Mains, Haddington; Mr James Durno, Upper Mill, Tarves; Mr James M'Laren, Coruton, Stirling; Mr W. P. Gilmour, Balmangan, Kirkcudbright.

1920.—Mr Thomas A. Buttar, Corston, Coupar-Angus; Mr John Speir, Newton Farm, Newton, Glasgow; Mr James Grieve, Rumbletonlaw, Greenlaw; Mr J. T. M'Laren, The Leuchold, Dalmeny House, Edinburgh; Major D. A. Spence, of Conveth Mains, Dunninald Mains, Montrose; Mr James R. Lumsden of Arden, Dumbartonshire; Mr James M'Queen of Crofts, Dalbeattie; General Sir Walter Charteris Ross of Cromarty, Cromarty.

Extraordinary Directors.—Mr John Elder, Tweedside Implement Works, Berwick-on-Tweed; Mr James Elder, Athelstaneford Mains, Drem; Mr Robert Park, Brunstane, Portobello; Mr Murray Little, Summerhill, Annan; Mr William Carrick, The Baad, Stirling; Mr John P. Sleigh, St John's Wells, Fyvie; Mr Hugh Martin, Flowerdale, Kinrossie, Perth; Colonel F. J. Carruthers of Dormont, Lockerbie; Mr John Elliot, Meigle, Clovenfords; Mr Robert Macdiarmid, Corries, Lochawe; Mr A. H. Anderson, Kippendavie Estates Offices, Dunblane; Colonel Edwin Bolton of West Plean, Bannockburn; Mr John Edmund of Gallamuir, Bannockburn; Mr John Fisher, Jellyholm, Alloa; Mr W. Watson Murray, Catter House, Drymen; Mr

Robert Paterson, Hill of Drip, Stirling; Provost of Stirling (1921); Mr Alex Robertson, Estate Office, Polmaise, Stirling; Captain James Kemp Smith (Messrs Kemp & Nicholson), Stirling; Mr J. L. Wilson, Muircot Farm, Tillicoultry.

Treasurer.—Sir David Wilson of Carbeth, Bart., D.Sc., Killearn.

Honorary Secretary.—Mr Alex. Cross of Knockdon, 19 Hope Street, Glasgow.

Aberdeen Show, 1920.

Mr **James M'Laren**, Cornton, Stirling, reported on the arrangements for the Show of this year, to be held at Aberdeen on Tuesday, 20th July, and three following days. As in former years, the Show would take place on the Links, the use of which, along with a supply of water, had been granted free of charge by the town of Aberdeen. The town had, in addition, given a donation of £100 to the funds of the Show.

The total value of the prizes and cups offered reached the sum of £4608. Entries for implements and machinery, which had now closed, were considerably in excess of last year's entries at Edinburgh. There was every indication that the entries of stock would be of a large and representative character.

It was satisfactory to report that the Ministry of Transport had agreed to restore the privilege whereby stock returning from the Show, unsold, were carried at half rates, and men in charge of stock travelled free.

Stirling Show, 1921.

Mr **William Carrick**, The Baad, Stirling, reported that the arrangements for the Stirling Show of 1921 were proceeding satisfactorily. With regard to the site at King's Park, it was hoped that the measures taken by the Directors would result in the ground being in suitable condition at the date of the Show.

Dumfries Show, 1922.

Lieut.-Col. **Carruthers** of Dormont reported that progress was being made with the arrangements for the Show of 1922, to be held in the Dumfries district. It was understood that the site which was used in 1910, which was in every way suitable, would be again available on this occasion.

Implements.

Mr **Phipps O. Turnbull**, Smeaton, Convener, submitted the following Interim Report on the work of the "Buckeye" Tractor Ditcher during the past year:—

"The Society has now practically completed a year of control of the 'Buckeye' Tractor Ditcher. It will be recalled that the machine was purchased and imported from America, the purchase price being paid by the Board of Agriculture for Scotland. At the request of the Board the Society undertook to take control of the machine for a year, any deficit on the year's working to be refunded by the Board up to a limit of £1000.

"Throughout the year the machine has been used experimentally in digging field drains in various parts of Scotland. It has been at work successively in Renfrewshire, Mid-Lothian, Dumfriesshire, Ross-shire, and Kincardineshire All varieties of soil have been encountered, including clay, moss, and sand. The depth of the drains cut has varied from 2½ to 3½ feet. The width of the cut is about 12 inches at the surface, tapering to about 7 inches at the bottom.

"Under suitable conditions the rate at which the cutting proceeds is from 3½ to 4 yards per minute. The excavated soil is deposited neatly at the side of the trench, ready for refilling. The bottom is left practically ready for the tiles, very little loose soil being left for removal by hand labour.

"While, therefore, under ideal conditions a large extent of ground could be drained in a short time, it will be readily understood that conditions were seldom ideal, and that stoppages were frequent. Occasional stones, if of moderate size, give no trouble, being removed and carried to the surface by the buckets. When large boulders are encountered the digging wheel must be raised out of the ground and the stones removed by hand. The most frequent cause of trouble has been old stone drains. These have been encountered on many parts of the land drained, and where several of them had to be cut through in the course of each trench excavated—which frequently happened—they gave rise to much loss of time and numerous minor breakages. Stiff clay, if the weather were dry, presented no difficulty. In sandy soil, full of water, there was a tendency for the trench to cave in after the machine had passed, but any difficulty in this connection was obviated by having the tiles laid immediately behind the machine. The best surface for operating the machine is lea, but it works well on ploughed land, provided it is dry.

"A good supply of spare parts was purchased with the machine. These were at first stored in Glasgow, but it was found more convenient to carry them with the machine, so as to save the time lost in forwarding parts required. Replacements have mainly been required of chains and sprocket wheels which communicate the drive to the digging wheel, these being easily replaced. A considerable amount of rebushing of bearings of pulleys connected with the digging wheel has been performed by the mechanic in charge. It has been found that for these bearings, which are constantly invaded by sand and grit, gun-metal bushes are more suitable, and last much longer than white metal. The digging teeth attached to the buckets or scoops have had, of course, to be replaced and resharpened frequently.

"Apart from a broken piston and connecting-rod, which were replaced by spares, there has been no engine trouble, and the engine is reported to be as good as new. The same may be said of the gear-box and caterpillar tracks, these showing practically no signs of wear. The clutch requires to be rebushed, and also the bearings of several of the intermediate shafts. These latter should be bushed with gun-metal.

"With these renewals, and a general overhaul, the machine would be in good order, and its life might be estimated at another four or five years. This estimate, however, is subject to revision in the light of further experience.

"The work performed by the machine has been inspected by thousands of farmers and others interested, and has been universally approved. There can be no doubt that for digging field drains it has proved an unqualified success.

"As to the cost of working, it is not possible at the present moment to give a complete statement. At first a charge of 2s. 6d. per chain was made, but later this was raised to 3s. 6d., and finally to 6s. At the first-mentioned figure the revenue did not meet the running costs, but at the 6s. rate there appears to be no doubt that, with reasonable freedom from accidents, the amount earned would easily cover working expenses. Wages of driver and assistant amount to £7, 10s per week. About 1 gallon of lubricating oil and from 1 to 1¼ gallon of petrol are used per hour of constant working.

"During a recent week the machine averaged 51 chains per day."

Law and Parliamentary.

Mr **David Ferrie**, Convener, reported that the Society had been represented at two recent Conferences at the Ministry of Food, at the latter of which it was decided to form a Fair Trading Council for potatoes and other vegetables, to advise the Food Controller as to supplies, price movements, and costs of production. While agreeing to the formation of this Council, the Society's representative had consistently urged the early removal of all control, pointing out that prices will not follow a normal course until production ceases to be hampered by control.

Agricultural Education.

Mr **Charles Douglas**, D.Sc., C.B., of Auchlochan, Vice-Convener, submitted a Report on the examination held at Leeds in April last for the National Diploma in Agriculture. 127 candidates presented themselves for examination. 33 candidates were from Scotland.

As a result of the examination 35 diplomas were awarded, 3 with honours.

Of the 127 candidates, 13 appeared for all the subjects, and of these 6 passed; 34 had passed certain subjects previously, and were completing the examination this year, and of these 29 obtained the diploma. The remaining 80 candidates presented themselves for a group of three or four subjects, and of these 35 passed in the subjects for which they appeared, and are entitled to appear for the remaining subjects in 1921.

Report by Chemist.

Dr J. F. **Tocher**, Consulting Chemist to the Society, submitted a Report on the work done in his department during the past half-year.

The substance of Dr Tocher's Report appears in another part of this volume.

The proceedings terminated with a vote of thanks to the Chairman.

GENERAL MEETING OF MEMBERS HELD IN THE SHOWYARD, ABERDEEN, 21st JULY 1920.

His Grace the Duke of Richmond and Gordon, K.G., President of the Society, in the Chair.

The **President**, in opening the meeting, expressed the pleasure of himself and the Society at the success which was attending the Show. What always indicated popularity and acceptance was the number of people who came along to see the exhibits. They had almost a record opening day, and he hoped that with the half-holiday in Aberdeen the "city" would walk solidly into the yard that afternoon. If they were inconvenienced by the crowd they must put up with it, because they realised that it was caused by the interest taken, not only by those in the northern parts, but also by those whose interests were linked up so much with theirs, and that the citizens of Aberdeen thoroughly appreciated the Show, and were there not merely as sightseers, but in pursuit of knowledge.

The late Mr John M'Diarmid.

Mr **David Ferrie**, Parbroath, Cupar-Fife, Chairman of Directors, alluded to the passing of Mr John M'Diarmid, the late chief clerk of the Society, whose services during the long period of forty-five years, along with those of the late Mr James Macdonald, the Secretary, built up the prosperity which they now saw in that great Society.

Votes of Thanks.

Mr **Ferrie** moved—"That a cordial vote of thanks be accorded to the Lord Provost, Magistrates, and Council of the City of Aberdeen for having provided a site for the Show and a supply of water free of charge, and having contributed £100 to the Show funds." Since ever the Highland and Agricultural Society held their first Show in Aberdeen, now well over a century ago, they had, he said, ever received from the Corporation every consideration which it was in their power to give. Had it been in their power to give a more extended site and remove the difficulties which the Society had in accommodating all the exhibits and erections of that Show, he thought their public spirit would have risen to the occasion.

The municipality, he was sure, recognised that the site was so near the town, although it was restricted, that the one detriment was equalled by its greater nearness to the city. If the occasion arose within the next eight years he believed the Lord Provost would take advantage of any opportunity that would give them, on the Show's next visit, a larger and a more suitable site to offer, if it could be procured in the immediate vicinity of the city. But while he made that suggestion, they were greatly indebted to the Lord Provost, Magistrates, and Town Council, and appreciated their efforts, knowing that they were doing their very best for the Society and the Show.

In the absence of Lord Provost Meff, ex-Lord Provost Sir **James Taggart**, who regretted the absence of the Lord Provost, said how much the citizens of Aberdeen appreciated the kind words that had been said in regard to Aberdeen. In a humorous speech he said that the city gave up the Links to the Society, but he was afraid they could not give them anything stronger than water. The water they did give was pure, and they thought it would be best to give the Highlanders that pure water. A dozen years was too long to stay away from the city of Aberdeen, but he was glad the Show would be back in eight years, and by that time the Town Council would try to extend the Links by levelling down the Broad Hill into the North Sea and give them more accommodation if they required it. He supposed they thought they were responsible for the weather. That was all arranged. They wanted to brighten up the city and make it fresh, and as the Links got a little dusty they just got a shower to lay the dust. That was the second worst day, to-day they would have sunshine, and the citizens would be down in their thousands and would see for themselves that they must provide better accommodation. "We are glad to take in a few strangers," proceeded Sir James, "and hope you will go away with pleasant memories of Aberdeen."

Dr **Charles Douglas**, D.Sc., C.B., of Auchlochan, moved a vote of thanks to the

Convener and members of the local Committee of Management for the successful manner in which they had carried through the Show arrangements. Although the local organisations of the Society were somewhat loose, he said it was remarkable how the members and supporters came forward in the various districts. The officials of the Society, who served the organisation so admirably and reliably, would be the very first to say that a great deal of the efficiency which characterised the management of the Shows was due to the help they received from local committees. If those committees were useful as a whole, they were even more so in Aberdeen, where the greatest possible efficiency was found. Such a result was due especially to the Convener, that reputed administrator, Mr Garden A. Duff of Hatton.

Mr G. A. **Duff**, in reply, said he was not at all sure that they deserved all those kind remarks, because their duties had been very light owing to the way in which Mr Stirton and the other officials of the Society had prepared everything so well in advance, that the duties which fell to the local Committee had not been in any way onerous. On behalf of the Committee he joined with the previous speakers in thanking the Corporation of Aberdeen for what it had done to bring about the undoubted success which had already attended, and would attend, the Show.

Mr G. B. **Shields**, Dolphingstone, Tranent, Convener of the Shows Committee, proposed a vote of thanks to the judges of Stock and Implements for the expeditious and satisfactory manner in which they had carried through their very responsible duties. They had a very efficient body of men to act as judges, and so far as they had heard they had carried through their duties, if not to the entire satisfaction of every exhibitor, he was sure to the entire satisfaction of themselves.

Mr J. R. **Campbell**, Glencassley, Rosehall, Invershin, Sutherland, replying, said there had been very few protests so far. That was a sign that the judges had done their duty satisfactorily.

Parliamentary Interference.

Lord Aberdeen proposed a vote of thanks to the Chairman.

The **Duke of Richmond and Gordon**, in reply, said he had been President of the County Agricultural Show in Sussex, and was very interested in coming from that place in the far south to another in the extreme north to find that the main features of the two Shows were the prosperity of and interest in the agriculture of this country. He had always maintained that agriculture was the premier industry of the country. They had had stormy times to come through, and he was not sure that the future would be so pleasant for the landed proprietor as it would be for his tenants. A sensible arrangement with regard to the remuneration of workers on the land was another matter. If they were to have high wages kept up in the present way, farmers ought to get some guarantee of a certain value for their produce, and under existing conditions he failed to see where agriculture was to show any great improvement. They were talked about in Parliament a good deal, but he was not of those who thought farming could be carried on by Parliamentary regulations. What was wanted was that it should be left to men who had spent their lives on the land to find out what suited their particular parts of the country best. The long and short of it was that the less farmers were interfered with the better it would be for agriculture generally. They spent their lives at it, and they must be credited with a certain amount of acquired knowledge. What he did not want to see was too many hard-and-fast regulations, but a little more of what might be called the "go-as-you-please" policy. It was their interest to get the most that could be got out of the land, and if they were only left alone and not worried and harassed with endless regulations, he was sure agriculture in this country would not only prosper, but they would be getting better and doing better, not only for themselves but for the whole Empire generally.

ANNIVERSARY GENERAL MEETING, 5TH JANUARY 1921.

Sir **David Wilson** of Carbeth, Bart., in the Chair.

New Members.

Four hundred and twenty-three candidates for election were balloted for and admitted Members of the Society.

Vacancy on Board of Directors.

On the recommendation of the Board of Directors, Mr A. B. Leitch, Inchstelly, Alves, Forres, was elected an Ordinary Director for the Inverness Division, to fill the vacancy caused by the death of Mr John C. Robertson, Fodderty.

Honorary Secretary.

Mr **David Ferrie** of Parbroath, Chairman of Directors, moved that, in accordance with the recommendation of the Board of Directors, Mr Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, be elected Honorary Secretary of the Society, in place of Mr Alexander Cross of Knockdon, whose resignation of that office, on account of ill-health, had been received, with deep regret, by the Directors.

Mr **Ferrie** said that Mr Douglas had long been connected with the Society. He had been a Director since 1908, and had occupied the position of Chairman of Directors for five years, during which period he had performed the duties with wisdom and zeal, and to the entire satisfaction of all concerned. He was sure the meeting would accept the recommendation, which was made with the fullest confidence by the Board of Directors.

Mr P. O. **Turnbull** seconded the motion, which was unanimously agreed to.

Mr **Douglas** thanked the members of the Society for the kind way in which they had confirmed the recommendation of his colleagues on the Board. He need not say that he appreciated the honour very highly.

He further hoped that the members would take that occasion of expressing their grateful thanks to Mr Alexander Cross for his great services to the Society. He moved accordingly, and the motion was carried unanimously.

Finance.

Mr **James** R. **Lumsden** of Arden, on behalf of the Convener of the Finance Committee, submitted the Accounts of the Society for the year to 30th November 1920. The receipts for the year from all sources reached a total of £30,326, 8s. 11d. This sum exceeded the outlays by £2170, 15s., and included life subscriptions to the amount of £3415, 10s. In the past year the expenditure on educational work amounted to £312, 8s. 10d., and on work in the chemical, veterinary, and botanical departments to £664, 2s. 1d.

He moved the approval of the usual grant of £20 to the Scottish Meteorological Society, and £5 to the Society for the Prevention of Cruelty to Animals, for the year 1921.

Mr **James Elder**, Athelstaneford Mains, Drem, seconded approval of the Accounts and Grants.

Mr **Archibald M'Neilage** pointed out that credit was taken in the Accounts of the Aberdeen Show for £855, 2s. 9d. payable by Exhibitors. He asked how it came about that Exhibitors, at that time of day, were owing over £800 to the Society. He also saw a debt of £333 to Exhibitors. He understood a suspension of payment, but he did not understand how Exhibitors were due to the Society over £800; and assuming that the £333 was set against the £850, were the Directors quite sure they were to get the difference of £500? On what basis were Exhibitors due that sum at that date?

The **Secretary**, in reply, said the £333 which Mr M'Neilage had mentioned was prize money which had not been drawn. Some winners of prizes had got cheques which they had not cashed, and there were a certain number of prizes retained until calving certificates were received or other conditions of the awards were implemented. The £855 was a new entry in the accounts, and arose through the Society being now its own Showyard contractors. The Society formerly engaged a Showyard contractor, but now the work was done by the Society itself under the supervision of Mr John Reid, who was appointed for that duty. The Society fitted up stands in the Showyard for implement exhibitors, seedsmen, manure merchants, and others. The amount £855 was made up of sums which had not been paid by these Exhibitors, and which were still outstanding at the time the books were closed on 30th November. A sum of £500 had been received since that date.

The Accounts and Grants were then approved.

Argyll Naval Fund.

Mr **Lumsden** submitted the report on the Argyll Naval Fund for 1919-1920, which showed that the income for the year amounted to £338, 11s. 6d., while the expenditure was £260, in grants to seven naval cadets.

Special Grants.

Mr **Ferrie** moved the approval of the following Special Grants, in accordance with the recommendations of the Board of Directors:—

(1) £800 to the Glasgow Veterinary College, towards the rearrangement of the building of the College for teaching purposes, and towards the better equipment of certain of its departments, in accordance with modern advancements in Veterinary Teaching.

(2) £1000 towards the funds of the Animal Diseases Research Association.

Mr Ferrie explained that in recommending a grant of £800 to the Glasgow Veterinary College the Directors had in view the fact that by so doing they would place that College on the same footing, in the matter of grants, as the Royal (Dick) Veterinary College, Edinburgh. The proposed grant of £1000 to the Animal Diseases Research Association was recommended on the same principle as the grant that had formerly been given to the Scottish Society for Research in Plant Breeding.

Mr **Thomas Kirk** of Abbey Mains seconded, and the Grants were approved.

Aberdeen Show, 1920.

Mr **James M'Laren**, Convener of the Shows Committee, reported upon the Aberdeen Show of last year. Apart from some rain on the opening day, the Show was favoured with good weather, and the attendance of the public was extremely gratifying. This was reflected in the drawings at the gates, which were far in excess of those at any previous Show in the district. The entries of live stock were numerous, and the quality of the animals shown was of a high order. A large extent of space was taken for the display of Implements and Machinery, and these formed a most creditable exhibition. The site provided on the Links by the city of Aberdeen, while smaller than might have been desired, and somewhat uneven of surface, was conveniently accessible for the general public. In addition to the site and a free supply of water, the town of Aberdeen gave a donation of £100 to the Show funds. The drawings at the gates and Grand Stands amounted to £14,000, and the estimated profit on the Show was approximately £1600.

Stirling Show, 1921.

Mr **William Carrick**, The Baad, Stirling, reported upon the arrangements for the Show of this year, to be held at Stirling. The date of the Show had now been fixed for Tuesday, the 26th July, and three following days. An excellent site was, as usual, provided in the King's Park. The town of Stirling had voted a subscription of £100 to the Show funds, besides undertaking to meet all claims for loss of crop by the tenant who had part of the King's Park under a course of cropping. The Prize List, which was in course of preparation, was an extremely liberal one, and there was every reason—given good weather—to expect a large and successful Show.

Dumfries Show, 1922.

Lieut.-Colonel F. J. **Carruthers** of Dormont, Lockerbie, reported that the arrangements for the Show of 1922, to be held at Dumfries, were progressing satisfactorily. The Society had again been fortunate in securing as a site for the Show the fields at Rotchell Park, on which the Show was held in the year 1910.

Show of 1923.

Sir **Kenneth Mackenzie** of Gairloch, Bart., moved—"That provided a suitable site is available, and satisfactory financial and other arrangements can be made, the Society's Show of 1923 be held in the Inverness district."

Sir Kenneth said that if the Society decided to hold the Show of 1923 in the Inverness district he could assure them of a very warm welcome, and that everything would be done to secure the success of the Show.

Mr **R. A. Smith**, Wester Lovat, in seconding, said that he had had an interview with the Provost of Inverness, who had assured him that if the Show were held in Inverness in 1923 every encouragement would be given and a free site provided.

The motion was unanimously agreed to.

Grants to Local Societies.

Mr **James M'Laren** submitted the report on District Shows and Competitions, showing that in 1920 grants of money and medals had been given in sixty-five districts. The total expenditure under this head amounted to £691, 3s. 7d. For the current year the Directors proposed the following grants: Under section 1, thirteen districts for grants of £12 each for cattle, horses, and sheep, and nineteen districts in intermediate competition, with a grant of three silver medals to each; under section 2, twelve districts for grants of £15 each for stallions; special grants of £40 to the Highland Home Industries; £50 for Federations of Women's Rural Institutes; £20 to Kilmarnock Cheese Show; £3 each to Orkney; Sanday, Orkney; East Mainland, and West Mainland, Orkney; a gold medal and a silver medal to the British Dairymaids' Association; a gold medal and a silver medal to the Fife Agricultural Society; eighteen districts for two medals each; the usual medals at ploughing and hoeing competitions; two medals each to five districts for cottages and gardens; Long Service medals and certificates, say £112—making the total sum offered in 1921, £757.

Science.

Report by Convener.

Dr **J. F. Tocher**, Consulting Chemist to the Society, gave a short report on behalf of the Convener of the Committee, on the progress of the Investigation being conducted by the Society into the Causes of Grass Sickness in Horses during the past year. He had reported that no vegetable poison could be found associated with this disease, so that the term "Grass Sickness" was a misnomer. It had been established that it was due to an anærobic bacillus, probably the *Bacillus Botulinus*, or one nearly allied to it. They had prepared toxins which produced symptoms similar to those exhibited in "Grass Sickness," the principal of which were impaction of the colon and paralysis of the gut. The ravages of the disease in the North of Scotland had been very severe during the last few years, and it was proposed to continue the investigation.

Report by Chemist.

Dr **Tocher** then reported on the work of his department during the year 1920. The substance of Dr Tocher's report appears in another part of this volume.

Implements.

Mr **P. O. Turnbull**, Convener, reported that the Committee had now submitted to the Directors and the Board of Agriculture for Scotland a statement of income and expenditure in connection with the working of the "Buckeye" Tractor Ditcher, covering the period from 5th May 1919 to 9th August 1920. The statement showed that there was a deficit on the year's working of £521, 4s. 1d., which sum fell to be refunded to the Society by the Board of Agriculture, in accordance with agreement. During that period 2758¾ chains were dug at charges varying from 3s. to 6s. per chain. To have made income meet expenditure, the charge per chain would require to have been at the rate of 6s. all over; or, if a sum of £280 were allowed for depreciation on the machine, 8s. per chain. In submitting these figures, the Committee pointed out that the period under review was largely an experimental one. With the experience gained, it was believed that the costs per chain of work done may be considerably reduced in the future, thereby providing a more favourable comparison with the costs of hand labour.

Education.

Mr **Charles Douglas**, D.Sc., C.B., of Auchlochan, Convener, reported on the results of the twenty-fifth examination held last autumn for the National Diploma in Dairying. At the examination in England there were 58 candidates, of whom 30 obtained the diploma and 28 failed; at the examination at Kilmarnock there were 32 candidates, 16 getting the diploma and 16 failing. The Diploma with Honours was awarded to four of the successful candidates at the English centre, and six at the Scottish centre. The names of the successful candidates, as well as the names of the winners of the National Diploma in Agriculture at the examination held last April, will be published in the next volume of 'Transactions.'

The examinations for these diplomas will again be held during the ensuing year.

The Society's examinations for First and Second Class Certificates in Forestry, which are held in alternate years, will be held here this year on 22nd, 23rd, and 24th March, provided a sufficient number of candidates present themselves for examination.

On the motion of Mr **Ferrie**, a cordial vote of thanks was accorded to Sir David Wilson, Bart., for presiding.

TABLE SHOWING THE VALUE OF FEEDING-STUFFS AS MANURE PER TON, AND THE COMPENSATION VALUE PER TON OF FOOD CONSUMED, BASED ON THE AVERAGE UNIT PRICES OF FERTILISERS FOR 1921.

The following is a Table showing (under Section A) the average proportions of digested nitrogen, undigested nitrogen, phosphoric acid, and potash present in the feeding-stuffs named. The Table also shows the value per unit of nitrogen (digested and undigested), phosphoric acid, and potash, the prices per unit being the average value per unit prevailing for 1921. Under Section B of the Table is shown the compensation value per ton of food consumed for each of the feeding-stuffs named, based on the unit prices for 1921. Column (1) of Section B of the Table shows the value per ton recovered in dung; Col. (2) of the same section shows the value of the lasting part of dung per ton; while the remaining three columns show the residual values per ton after one crop, two crops, and three crops have been removed.

FOODS.	VALUATION PER					
	Digested Nitrogen.			Undigested Nitrogen.		
	Per cent in food.	Value at 24s. per unit.*	Two-fifths value to manure.	Per cent in food.	Value at 16s 9d. per unit.*	Three-fourths value to manure.
		s. d.	s d.		s. d.	s. d.
Cotton-cake, decorticated .	5·92	142 1	56 10	0·98	16 5	12 4
Cotton-cake, undecorticated .	2·73	65 6	26 2	0·81	13 7	10 2
Linseed cake	4·08	97 11	39 2	0·67	11 3	8 6
Linseed	3·28	78 9	31 6	0·32	5 4	4 0
Soya bean cake	6·10	146 5	58 7	0·75	12 7	9 5
Palm-nut cake	1·88	45 1	18 0	0·62	10 5	7 10
Cocoa-nut cake	2·65	63 7	25 5	0·75	12 7	9 5
Earth-nut cake	6·86	164 8	65 10	0·76	12 9	9 7
Rape-cake	3·97	95 3	38 1	0·93	15 7	11 8
Beans	3·48	83 6	33 5	0·52	8 9	6 7
Peas	3·10	74 5	29 9	0·50	8 5	6 4
Wheat	1·49	35 9	14 4	0·31	5 2	3 11
Barley	1·16	27 10	11 2	0·49	8 2	6 2
Oats	1·52	36 6	14 7	0·48	8 0	6 0
Maize	1·22	29 3	11 8	0·48	8 0	6 0
Rice-meal	1·08	25 11	10 4	0·82	13 9	10 4
Locust beans	0·92	19 8	7 10	0·38	6 4	4 9
Malt	1·34	32 2	12 10	0·36	6 0	4 6
Malt culms	3·12	74 11	30 0	0·78	13 1	9 10
Bran	1·98	47 6	19 0	0·52	8 9	6 7
Brewers' and distillers' grains (dried)	2·34	56 2	22 6	0·96	16 1	12 1
Brewers' and distillers' grains (wet)	0·59	14 2	5 8	0·22	3 8	2 9
Dried distillery dreg . .	3·45	82 10	33 2	1·86	31 2	23 5
Clover hay	1·21	29 0	11 7	1·03	17 3	12 11
Meadow hay	0·88	21 1	8 5	0·62	10 5	7 10
Wheat straw	0·02	0 6	0 2	0·43	7 2	5 5
Barley straw	0·10	2 5	1 0	0·30	5 0	3 9
Oat straw	0·17	4 1	1 8	0·33	5 6	4 2
Mangolds	0·15	3 7	1 5	0·07	1 2	0 11
Swedes	0·16	3 10	1 6	0·09	1 6	1 2
Turnips	0·13	3 1	1 3	0·05	0 10	0 8
Fish-meal	8·08	193 11	77 7	0·90	15 1	11 4

Average values

A.

TON AS MANURE.

B.
COMPENSATION VALUE PER TON OF FOOD CONSUMED.

Phosphoric Acid.					Potash.					(1) Value re-covered in dung.		(2) Value of lasting part of dung.		Residual Value after.					
Per cent in food.	Value at 9s. 6d. per unit.*		Three-fourths value to manure.		Per cent in food.	Value at 8s. 6d. per unit.*		Three-fourths value to manure.						(3) One crop.		(4) Two crops.		(5) Three crops.	
	s.	d.	s.	d.		s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
3·10	44	9	33	7	2·00	17	0	12	9	115	6	58	8	29	4	14	8	7	4
2·00	19	0	14	3	2·00	17	0	12	9	63	4	37	2	18	7	9	4	4	8
2·00	19	0	14	3	1·40	11	11	8	11	70	10	31	8	15	10	7	11	4	0
1·54	14	8	11	0	1·37	11	8	8	9	55	3	23	9	11	11	6	0	3	0
1·30	12	4	9	3	2·20	18	8	14	0	91	3	32	8	16	4	8	2	4	1
1·20	11	5	8	7	0·50	4	3	3	2	37	7	19	7	9	10	4	11	2	6
1·40	13	4	10	0	2·00	17	0	12	9	57	7	32	2	16	1	8	1	4	1
2·00	19	0	14	3	1·50	12	9	9	7	99	3	33	5	16	9	8	5	4	3
2·50	23	9	17	10	1·50	12	9	9	7	77	2	39	1	19	7	9	10	4	11
1·10	10	5	7	10	1·30	11	1	8	4	56	2	22	9	11	5	5	9	2	11
0·85	8	1	6	1	0·96	8	2	6	2	48	4	18	7	9	4	4	8	2	4
0·85	8	1	6	1	0·53	4	6	3	5	27	9	13	5	6	9	3	5	1	9
0·75	7	1	5	4	0·55	4	8	3	6	26	2	15	0	7	6	3	9	1	11
0·60	5	8	4	3	0·50	4	3	3	2	28	0	13	5	6	9	3	5	1	9
0·60	5	8	4	3	0·37	3	2	2	5	24	4	12	8	6	4	3	2	1	7
0·60	5	8	4	3	0·37	3	2	2	5	27	4	17	0	8	6	4	3	2	2
0·80	7	7	5	8	0·80	6	10	5	2	23	5	15	7	7	10	3	11	2	0
0·80	7	7	5	8	0·60	5	1	3	10	26	10	14	0	7	0	3	6	1	9
2·00	19	0	14	3	2·00	17	0	12	9	66	10	36	10	18	5	9	3	4	8
3·60	49	6	37	2	1·45	12	4	9	3	72	0	53	0	26	6	13	3	6	8
1·61	15	4	11	6	0·20	1	8	1	3	47	4	24	10	12	5	6	3	3	2
0·42	4	0	3	0	0·05	0	5	0	4	11	9	6	1	3	1	1	7	0	10
0·44	4	2	3	2	0·22	1	10	1	4	61	1	27	11	14	0	7	0	3	6
0·57	5	5	4	1	1·50	12	9	9	7	38	2	26	7	13	4	6	8	3	4
0·40	3	10	2	11	1·60	13	7	10	2	29	4	20	11	10	6	5	3	2	8
0·24	2	3	1	8	0·80	6	10	5	2	12	5	12	3	6	2	3	1	1	7
0·18	1	9	1	4	1·00	8	6	6	5	12	6	11	6	5	9	2	11	1	6
0·24	2	3	1	8	1·00	8	6	6	5	13	11	12	3	6	2	3	1	1	7
0·07	0	8	0	6	0·40	3	5	2	7	5	5	4	0	2	0	1	0	0	6
0·06	0	7	0	5	0·22	1	10	1	4	4	5	2	11	1	6	0	9	0	5
0·05	0	6	0	5	0·30	2	7	1	11	4	3	3	0	1	6	0	9	0	5
7·24	84	1	63	1	0·50	4	3	3	2	155	2	77	7	38	10	19	5	9	9

per unit for 1921.

APPENDIX

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND IN 1921

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GENERAL NOTICE.

The Highland Society was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continuously directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to The Highland and Agricultural Society of Scotland.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.
2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.
3. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture; and by giving grants in aid of education in Agriculture and allied sciences. In 1900 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.
4. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Terminated in 1881 in accordance with arrangements with the Royal College of Veterinary Surgeons.
5. The institution of a National Examination in Dairying, jointly with the Royal Agricultural Society of England.
6. The institution of an Examination in Forestry for First and Second Class Certificates.
7. The appointment of a chemist for the purpose of promoting the application of science to agriculture.
8. The establishment of a Botanical Department.
9. The appointment of Entomologist to advise members regarding insect pests.
10. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.
11. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of The Highland and Agricultural Society is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members — Nine nominated by the Charter, and Seven elected by the Society.

PRIVILEGES OF MEMBERS

Members of the Society are entitled—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.*[1]
6. *To have Manures and Feeding-Stuffs analysed at reduced fees.*
7. *To have Seeds tested at reduced fees.*
8. *To have Insect Pests and Diseases affecting Farm Crops inquired into.*
9. *To attend and vote at General Meetings of the Society.*
10. *To vote for the Election of Directors, &c., &c.*

ANALYSIS OF MANURES AND FEEDING-STUFFS

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow:—

The estimation of *one* ingredient in a manure or feeding-stuff	5s.
The estimation of *two or more* ingredients in a manure or feeding-stuff	10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

Higher Subscription.—The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

Lower Subscription.—Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with Agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 3s.[2] Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 3s. 6d. or 10s. list).

JOHN STIRTON, *Secretary.*

3 George IV. Bridge, Edinburgh.

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[1] Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

[2] Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

ESTABLISHMENT FOR 1920-1921.

President.

DUKE OF MONTROSE, K.T., Buchanan Castle, Drymen.

Vice-Presidents.

The Earl of Moray, Kinfauns Castle, Perthshire.
General Archibald Stirling of Keir, Dunblane.
Lord Balfour of Burleigh, K.T., Kennet, Alloa.
John James Moubray of Naemoor, Rumbling Bridge.

Ordinary Directors.

Year of Election.	
1917	W. A. Dron, Crieffvechter, Crieff (Jan. 1919).
	John M'Caig of Belmont, Stranraer.
	Andrew B. Leitch, Inchstelly, Alves, Forres (Jan. 1921).
	Lord Forteviot, Dupplin Castle, Perth.
	Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow.
	Moffat S. Thomson of Lambden, Spotsmains, Kelso.
	Alexander Cowan, Valleyfield, Penicuik.
	Alexander Forbes, Rettie, Banff.
1918	Robert Macmillan of Holm of Dalquhairn, Woodlea, Moniaive.
	Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Pl., Edinburgh.
	David Ferrie of Parbroath, Cupar-Fife.
	William Donald, Fardalehill, Kilmarnock.
	Robert Dickinson, Longcroft, Oxton.
	Phipps O. Turnbull, Smeaton, Dalkeith.
	Colonel J. L. Reid of Cromley Bank, Ellon.
	J. Ernest Kerr of Harviestoun Castle, Dollar.
1919	R. A. Smith, Wester Lovat, Beauly.
	William Meiklem, Begg, Kirkcaldy.
	Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart. Ardgowan, Greenock.
	H. B. Marshall of Rachan, Broughton.
	Thomas Kirk of Abbey Mains, Haddington.
	James Durno, Upper Mill, Tarves.
	James M'Laren, Cornton, Stirling.
	W. P. Gilmour, Balmangan, Kirkcudbright.
1920	Thomas A. Buttar, Corston, Coupar-Angus.
	John Spier, Newton Farm, Newton, Glasgow.
	James Grieve, Rumbletonlaw, Greenlaw.
	J. T. M'Laren, The Leuchold, Dalmeny House, Edinburgh.
	Major D. A. Spence, V.D., of Conveth Mains, Montrose.
	James R. Lumsden of Arden, Dumbartonshire
	James M'Queen of Crofts, Dalbeattie.
	General Sir Walter Charteris Ross of Cromarty, Cromarty.

WILLIAM CARRICK, The Baad, Stirling.
ALEXANDER COWAN, Valleyfield, Penicuik.
ROBERT DICKINSON, Longcroft, Oxton.
WILLIAM DONALD, Fardalehill, Kilmarnock.
JAMES DURNO, Uppermill, Tarves.
JOHN EDMUND of Gallamuir, Bannockburn.
JOHN ELDER, Tweedside Implement Works, Berwick-on-Tweed.
JOHN ELLIOT, Meigle, Galashiels.
DAVID FERRIE of Parbroath, Cupar-Fife.
JOHN FISHER, Jellyholm, Alloa.
ALEXANDER FORBES, Rettie, Banff.
LORD FORTEVIOT, Dupplin Castle, Perth.
W. P. GILMOUR, Balmangan, Kirkcudbright
JAMES GRIEVE, Rumbletonlaw, Greenlaw.
J. ERNEST KERR of Harviestoun Castle, Dollar.
THOMAS KIRK of Abbey Mains, Haddington.
MURRAY LITTLE, Summerhill, Annan.
JAMES R. LUMSDEN of Arden, Dumbartonshire.
JOHN M'CAIG of Belmont, Stranraer.
R. MACDIARMID, Corries, Lochawe.
Sir KENNETH MACKENZIE of Gairloch, Bart., 10 Moray Place.
J. T. M'LAREN, The Leuchold, Dalmeny House.
ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
JAMES M'QUEEN of Crofts, Dalbeattie.
HUGH MARTIN, Flowerdale, Kinrossie, Perth.
H. B. MARSHALL of Rachan, Broughton.
WILLIAM MEIKLEM, Begg, Kirkcaldy.
W. WATSON MURRAY, Catter House, Drymen.
ROBERT PARK, Brunstane, Portobello.
ROBERT PATERSON, Hill of Drip, Stirling.
Provost ROBERT M'CULLOCH, Stirling.
Colonel J. L. REID of Cromley Bank, Ellon.
ALEXANDER ROBERTSON, Estate Office, Polmaise, Stirling.
JOHN P. SLEIGH, St John's Wells, Fyvie.
Captain JAMES KEMP SMITH, Stirling.
R. A. SMITH, West Lovat, Beauly.
JOHN SPIER, Newton Farm, Newton.
Major D. A. SPENCE, V.D., of Conveth Mains, Dunninald Mains, Montrose.
Sir HUGH SHAW STEWART of Greenock and Blackhall, Bart., C.B. Ardgowan.
General ARCHIBALD STIRLING of Keir, Dunblane.
MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
PHIPPS O. TURNBULL, Smeaton, Dalkeith.
J. L. WILSON, Muircot Farm, Tillicoultry.
Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio.*
CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary, *ex officio.*
Professor R. STANFIELD, 24 Mayfield Gardens, Edinburgh, Engineer, *ex officio.*

5. IMPLEMENTS AND MACHINERY.

HIPPS O. TURNBULL, Smeaton, Dalkeith, *Convener.*
1. *Argyll* . CARRICK, The Baad, Stirling.
2. ***Finance, Chambers,*** allamuir, Bannockburn.
3. ***Publications*** . . aneford Mains, Drem.
4. ***Shows*** . . . e Implement Works, Berwick-on-Tweed.
5. *Implements and Machin* lovenfords.
6. ***Science*** . . . ath, Cupar-Fife.
7. ***General Purposes*** . , Banff.
8. ***Education*** . . . . ins, Haddington.
9. ***Forestry*** . . . . elly, Alves.
10. *Law and Parliamentary* . airloch, Bart., 10 Moray Place.

JAMES M'LAREN, Cornton, Stirling.
J. T. M'LAREN, The Leuchold, Dalmeny House.
HUGH MARTIN, Flowerdale, Kinrossie, Perth.
ROBERT PARK, Brunstane, Portobello.
Colonel J. L. REID of Cromley Bank, Ellon
JOHN P. SLEIGH, St John's Wells, Fyvie.
Captain J. KEMP SMITH, Stirling.
R. A. SMITH, West Lovat, Beauly.
Major D. A. SPENCE, V.D., of Conveth Mains, Montrose.
MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *ex officio.*
CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, *ex officio.*
Professor STANFIELD, 24 Mayfield Gardens, *ex officio.*

6. SCIENCE.

Sir DAVID WILSON, Bart., D.Sc., of Carbeth, Killearn, *Convener.*
CHARLES DOUGLAS, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary, *Vice-Convener.*
T. A. BUTTAR, Corston, Coupar-Angus.
ALEXANDER COWAN, Valleyfield, Penicuik.
JAMES ELDER, Athelstaneford Mains, Drem.
DAVID FERRIE of Parbroath, Cupar-Fife.
LORD FORTEVIOT, Dupplin Castle, Perth.
W. P. GILMOUR, Balmangan, Kirkcudbright.
JAMES GRIEVE, Rumbletonlaw, Greenlaw.
J. ERNEST KERR of Harviestoun Castle, Dollar.
THOMAS KIRK of Abbey Mains, Haddington.
ANDREW B. LEITCH, Inchstelly, Alves.
MURRAY LITTLE, Summerhill, Annan.
JOHN M'CAIG of Belmont, Stranraer.
R. MACDIARMID, Corries, Lochawe.
Sir KENNETH MACKENZIE of Gairloch, Bart., 10 Moray Place, Edinburgh.
JAMES M'LAREN, Cornton, Stirling.
JAMES M'QUEEN of Crofts, Dalbeattie.
H. B. MARSHALL of Rachan, Broughton.
HUGH MARTIN, Flowerdale, Kinrossie, Perth.
ROBERT PARK, Brunstane, Portobello.
ALEXANDER ROBERTSON, Estates Gffice, Polmaise, Stirling.
General Sir W. C. ROSS of Cromarty, Cromarty.
JOHN SPEIR, Newton Farm, Newton.
Sir HUGH SHAW STEWART, Bart., C.B., of Greenock and Blackhall, Ardgowan, Greenock.
MOFFAT S. THOMSON of Lambden, Spotsmains, Kelso.
PHIPPS O. TURNBULL, Smeaton, Dalkeith.
Dr J. F. TOCHER, Chemist, *ex officio.*
A. N. M'ALPINE, Botanist, *ex officio.*
R. S. MACDOUGALL, D.Sc., Zoologist, *ex officio.*

7. GENERAL PURPOSES.

DAVID FERRIE of Parbroath, Cupar-Fife, *Convener.*
ALEXANDER COWAN, Valleyfield, Penicuik.
ROBERT DICKINSON, Longcroft, Oxton.
JAMES ELDER, Athelstaneford Mains, Drem.
JOHN ELLIOT of Meigle, Clovenfords.
THOMAS KIRK of Abbey Mains, Haddington.
JAMES M'LAREN, Cornton, Stirling.
J. T. M'LAREN, The Leuchold, Dalmeny House.
ROBERT MACMILLAN of Holm of Dalquhairn, Woodlea, Moniaive.
JAMES M'QUEEN of Crofts, Dalbeattie.
WILLIAM MEIKLEM, Begg, Kirkcaldy.
ROBERT PARK, Brunstane, Portobello.

Sir Hugh Shaw Stewart, Bart., C.B., of Greenock and Blackhall, Ardgowan.
Phipps O. Turnbull, Smeaton, Dalkeith.
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*.
Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary, *ex officio*.

8. EDUCATION.

Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, *Convener*.
Colonel F. J. Carruthers of Dormont, Lockerbie.
David Ferrie of Parbroath, Cupar-Fife.
Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock.
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn.
John Stirton, *Secretary*, Highland and Agricultural Society.

9. FORESTRY.

Sir Archibald Buchan Hepburn of Smeaton, Bart., 21 Lansdowne Crescent, Edinburgh, *Convener*.
A. H. Anderson, Kippendavie, Dunblane.
Lieut.-Col. F. J. Carruthers of Dormont, Lockerbie.
James I. Davidson, Saughton Mains, Corstorphine.
Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow.
Sir Henry Dundas, Bart., M.V.O., Polton House, Lasswade.
Sir John R. Findlay of Aberlour, 27 Drumsheugh Gardens, Edinburgh.
Lord Forteviot, Dupplin Castle, Perth.
Colonel Sir John Gilmour, Bart., M.P., D.S.O., of Montrave, Leven.
Earl of Home, Springhill, Coldstream.
J. H. Milne Home, Irvine House, Canonbie.
David Keir, Ladywell, Dunkeld.
Lord Lovat, C.B., D.S.O., &c., Beaufort Castle, Beauly.
A. D. Macdonald, Yester Estates Office, Gifford.
Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Place.
Maclachlan of Maclachlan, Castle Lachlan, Strachur.
H. B. Marshall of Rachan, Broughton.
Right Hon. Sir Herbert E. Maxwell of Monreith, Bart., Whauphill.
Sir Hugh Shaw Stewart, Bart., C.B., of Greenock and Blackhall, Ardgowan.
Sir John Stirling Maxwell of Pollok, Bart., Pollokshaws.
John Michie, M.V.O., Kincaim, Blair, Aberdeen.
Lord Polwarth, Humbie House, Upper Keith.
Colonel Archibald Stirling of Keir, Dunblane.
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn.

10. OFFICE-BEARERS.

Constitution: (1) The four Ordinary Directors for the district in which the Show for the year is to be held (with the exception of one retiring next year); (2) one Ordinary Director from each of the other Show districts; and (3) the Chairman of the Board, Hon. Secretary, and Treasurer, *ex officiis*.

Dumfries .	R. M'Millan of Holm of Dalquhairn, Woodlee, Moniaive.
	W. P. Gilmour, Balmangan, Kirkcudbright.
	James M'Queen of Crofts, Dalbeattie.
Inverness .	Sir Kenneth Mackenzie of Gairloch, Bart., 10 Moray Place.
Perth .	William Meiklem, Begg, Kirkcaldy.
Glasgow .	Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock.
Borders .	James Grieve, Rumbletonlaw, Greenlaw.
Edinburgh	Phipps O. Turnbull, Smeaton, Dalkeith.
Aberdeen .	Colonel J. L. Reid of Cromley Bank, Ellon.
Stirling .	James M'Laren, Cornton, Stirling.

David Ferrie of Parbroath, Cupar-Fife, Chairman, *ex officio*.
Charles Douglas, D.Sc., C.B., of Auchlochan, Hon. Secretary, *ex officio*.
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn, Treasurer, *ex officio*.

11. LAW AND PARLIAMENTARY.

Glasgow . John Speir, Newton Farm, Newton,
Perth . T. A. Buttar, Corston, Coupar-Angus.
Stirling . W. A. Dron, Crieffvechter, Crieff.
Edinburgh. James Elder, Athelstaneford Mains, Drem.
Aberdeen . John P. Sleigh, St John's Wells, Fyvie.
Dumfries . John M'Caig of Belmont, Stranraer.
Inverness . R. A. Smith, Wester Lovat, Beauly.
Border . John Elliot, Meigle, Clovenfords.
Lord Forteviot, Dupplin Castle, Perth.
Murray Little, Summerhill, Annan.
Sir Hugh Shaw Stewart of Greenock and Ardgowan, Bart., C.B.
David Ferrie of Parbroath, Cupar-Fife, Chairman, *ex officio* (*Convener*).
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn, *Treasurer*, *ex officio*.
Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow, Hon. Secretary, *Vice-Convener*, *ex officio*.

REPRESENTATIVES ON OTHER BODIES.

National Agricultural Examination Board.

Colonel F. J. Carruthers of Dormont, Lockerbie.
Charles Douglas, D.Sc., C.B., of Auchlochan, Lesmahagow.
David Ferrie of Parbroath, Cupar-Fife.
Sir Hugh Shaw Stewart, C.B., of Greenock and Blackhall, Bart., Ardgowan, Greenock.
Sir David Wilson, Bart., D.Sc., of Carbeth, Killearn.
John Stirton, *Secretary*, Highland and Agricultural Society.

Board of Scientific Societies.

Charles Douglas, D Sc , C.B., of Auchlochan, Lesmahagow.

Edinburgh and East of Scotland College of Agriculture.

John Stirton, *Secretary*, Highland and Agricultural Society.

West of Scotland Agricultural College.

Sir Hugh Shaw Stewart, Bart., C.B., of Ardgowan and Blackhall, Ardgowan, Greenock.
John M'Caig of Belmont, Stranraer.

Aberdeen and North of Scotland College of Agriculture.

William Duthie, Tarves.
Dr J. F. Tocher, 41½ Union Street, Aberdeen.

Royal (Dick) Veterinary College.

Sir Archibald Buchan Hepburn of Smeaton, Bart., 21 Lansdowne Crescent, Edinburgh.

Glasgow Veterinary College.

James R. Lumsden of Arden, Dumbartonshire.

Scottish Milk Records Association.

John M'Caig of Belmont, Stranraer.
Major D. A. Spence, V.D., of Conveth Mains, Montrose.
Sir Hugh Shaw Stewart, Bart., C.B., of Greenock and Blackhall.

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, in the Society's Hall, 3 George IV. Bridge, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show. This year it will be held at Stirling, on Wednesday, 27th July, at an hour to be announced in the programme of the Show.

With reference to motions at General Meetings, Bye-Law No. 10 provides—"That at General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given a week previously to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

General Show at Stirling—26th, 27th, 28th, and 29th July.—Entries close for Implements, 23rd May; Stock, Poultry, Dairy Produce, &c., 9th June.

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November till June inclusive, at half-past one o'clock P.M., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Committee Meetings.—Meetings of the various Committees are held as required.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Divisions on the Board for the year 1921-1922, will be held at the places and on the days after mentioned:—

1. Edinburgh, Market Buildings, Gorgie,	Wed., 25th Jan. 1922, at 1.
2. Cupar, County Buildings, . . .	Tues., 21st Feb. 1922, at 1.
(*In* 1923 *the Meeting will be held at Cupar*; *in* 1924 *and* 1925 *at Perth.*)	
3. Glasgow, North British Railway Hotel,	Wed., 15th Feb. 1922, at 1.
4. Stirling, Golden Lion Hotel, . .	Thur., 16th Feb. 1922, at 1.30.
5. Border, Railway Hotel, St Boswells, .	Thur., 23rd Feb. 1922, at 1.
6. Aberdeen, Imperial Hotel, . . .	Fri., 24th Feb. 1922, at 2.30.
7. Inverness, Station Hotel, . . .	Tues., 28th Feb. 1922, at 12.30.
8. Dumfries, King's Arms Hotel, . .	Wed., 8th Mar. 1922, at 1.30.

The nomination of Proprietor or other Member paying the higher subscription must be made in the 4th, 6th, 7th, and 8th Divisions; and the nomination of Tenant-Farmer or other Members paying the lower subscription, in the 1st, 2nd, 3rd, and 5th Divisions.

Retiring Directors are not eligible for re-election until after the lapse of at least one year.

EXAMINATIONS.

Agriculture.—The Examination for 1921 for the National Diploma in Agriculture will be held at the University, Leeds, on Friday, 8th April 1921, and following days. Entries close on 1st March.

Dairy.—The Examination for 1921 for the National Diploma in Dairying will be held at the Dairy School, Kilmarnock, on Friday, 23rd September, and following days. Entries close on 13th August.

Forestry.—The Examination for the Society's Certificates in Forestry will be held at 3 George IV. Bridge, Edinburgh, in March 1922.

AGRICULTURAL EDUCATION

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture. In 1872 the Free Life Membership of the Society was granted to winners of the Diploma. In 1884 permission was given to holders of the Diploma to append the letters F.H.A.S. to their names.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint-Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.) This Examination is now conducted under the management of the "National Agricultural Examination Board" appointed by the two Societies. In the year 1903, on the invitation of the two Societies, the Ministry of Agriculture and Fisheries and the Scottish Education Department agreed to appoint a representative from each to act on the Examination Board. Sir Daniel Hall represents the former, and Sir John Struthers, K.C.B., LL.D., the latter body.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF AGRICULTURE

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an Annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral Examinations.

4. In order to be eligible to sit for the Board's Examination in Agriculture, a Candidate must—

(*a*) Present a certificate from a recognised Agricultural College that his attainments in the subjects of *General Botany*, *Geology*, *General Chemistry*, *Physics and Mechanics*, as attested by class and other examinations, are, in the opinion of the authorities of the College, such as to justify his admission to the Board's Examination ; *or*

(*b*) Produce evidence that he has passed the 1st B.Sc. or the Intermediate Examination in Science of a British University ; *or*

(*c*) Present a Senior Certificate obtained at the Local Examinations of the Universities of Oxford or Cambridge, and produce evidence that he has continued his study of science for at least a year, and has obtained a certificate in subject 3 (*a*) Elementary Chemistry and Physics, (*b*) Botany of Group H of the Oxford Higher Local Examination, *or* in Subjects 1, Elementary Chemistry and Physics, and 4, Botany of Group E of the Cambridge Higher Local Examination ; *or* (*d*) Present an Intermediate Leaving Certificate of the Scottish Education Department, and produce evidence that he has continued his studies for at least another year and has obtained the Higher Leaving Certificate in Science (including Chemistry and Botany).

5. In the case of students who satisfy the Board that they have not had the facilities for obtaining the foregoing certificates, the Board will be prepared to consider evidence of equivalent attainment.

6. Candidates will have the option of taking the whole of the following eight papers at one time, or of sitting for a group of any three or four in one year and the remaining group of four or five in the next year.

SUBJECT.	Maximum Marks	Pass Marks.
1. Practical Agriculture (First Paper)	300	180
2. Practical Agriculture (Second Paper) . .	300	180
3. Farm and Estate Engineering—		
(*a*) Surveying and Farm Buildings	150	75
(*b*) Machinery and Implements .	150	75
4. Agricultural Chemistry	300	150
5. Agricultural Botany . . .	300	150
6. Agricultural Book-keeping	200	100
7. Agricultural Zoology . . .	200	100
8. Veterinary Science	200	100
	2100	1110

7. A Candidate who obtains not less than three fourths (1575) of the aggregate maximum marks (2100) in the entire Examination will receive the Diploma with Honours, provided that he obtains not less than three-fourths (450) of the maximum marks (600) in the two Practical Agriculture papers

8 Candidates electing to take the entire Examination at one time and failing in not more than two subjects may appear for these subjects in the following year Failure in more than two subjects will be regarded as failure in the whole Examination.

9 Candidates electing to take the Examination papers in two groups and failing in a single subject may appear for that subject in the following year. Failure in more than one subject will be regarded as failure in the group

10. Non-returnable fees must be paid by Candidates as follows :—

Entire Examination	Six guineas.
Group of Subjects . . .	Three guineas.
One or two Subjects	One pound.

11. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular Candidate to the Examination.

The Examination will take place at the Leeds University on FRIDAY, APRIL 8, 1921, and days of the following week.

Forms of application for permission to sit at the Examination may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C. 1," or from "The Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh," and must be returned duly filled up not later than TUESDAY, MARCH 1ST, 1921, when the Entries will close.

16 BEDFORD SQUARE, LONDON, W.C. 1,
December 1920.

SYLLABUS OF SUBJECTS OF EXAMINATION

PRACTICAL AGRICULTURE.

I.—First Paper.

1. *British Farming.*—Arable, stock-raising, dairying—Approximate areas covered by the different systems—Typical examples of each—Area in Great Britain under chief crops—Numbers of live stock—The recent history of agriculture—Short summary of agricultural returns.

2. *Climate.*—The effect of climate on farming practice—Rainfall—Temperature—Prevailing winds—Weather forecasts.

3. *Soils.*—The influence of geological formations on the systems of farming—Classification of soils—Character and composition—Suitability for cultivation—Reclamation—Drainage—Irrigation—Warping—Application of lime and marl—Bare fallows—Tillage—Subsoiling—Deep and thorough cultivation.

4. *Manures.*—The manures of the farm—The treatment of farmyard manure—The disposal of liquid manure and sewage—General manures—Special manures—Field trials of manures—The application of manures—Period of application and amounts used per acre—Unexhausted value of manures and feeding-stuffs.

5. *Crops.*—Wheat, barley, oats, rye, beans, peas, potatoes, turnips, swedes, mangolds, forage plants, hops, and other crops—Their adaptation to different soils and climates—Varieties—Selection of seed—Judging seeds—Cultivation, weeds and parasitic plants, best methods of prevention and eradication—Harvesting—Storing—Cost of production—Improvement of crops by selection and hybridising—Field trials—Methods which the farmer may adopt—Selection to resist disease—The principles of rotations—Rotations suitable for different soils and climates—Rotations and the maintenance of fertility—Green manuring—Leguminous crops in rotation—Catch crops—The advantages and disadvantages of rotations—Specialised farming.

II.—Second Paper.

6. *Live Stock.*—The different breeds of British live stock—Their origin, characteristics, and comparative merits—Suitability for different districts—Breeding—General principles—Selection—Mating—Crossing—Rearing and general management—Breeding and rearing of horses, cattle, sheep, pigs and poultry—Rearing colts and raising store stock—The foods of the farm—Their composition and suitability for different classes of stock—Purchased foods—Composition and special value—Rations for different kinds and ages of stock—Cost of producing beef, mutton, pork, and milk—Cost of feeding farm horses.

7. *The disposal of Crop, Produce, and Stock.*—Marketing grain and other crops—Sale of stock—Live weight—Dead weight.

8. *Milk.*—The production and treatment of milk—The manufacture of cheese, butter, &c.—The utilisation of by-products.

9. *Farming Capital.*—Calculations of the stocking and working of arable, stock, and dairy farms—Labour on the farm—Farm valuations—Rent and taxes.

10. *Renting a Farm.*—Indications of condition, productive power, and stock-carrying capacity—Leases—Conditions of occupancy.

N.B.—*It is essential that a Candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm routine.*

III.—FARM AND ESTATE ENGINEERING.

Note.—Candidates must obtain pass marks separately in subjects (a) *and* (b), *and these two parts will rank as of equal value.*

(*a*) SURVEYING AND FARM BUILDINGS.

1. The use and adjustment of instruments employed in Surveying and Levelling.

2. Land surveying by chain—Plotting from field book, and determination of areas surveyed—The simpler "field problems."

3. Levelling and plotting from field book.

4. A sufficient knowledge of Trigonometrical Surveying for the determination of heights and distances by Theodolite.

5. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

6. *Roads and Fences.*—The construction and maintenance of farm roads, fences, and ditches.

7. *Land Drainage.*—Objects and methods of draining; mole and pipe drains; construction and maintenance of cost of drains.

8. *Buildings.*—Buildings required on different classes of farms—Economical arrangement of farm buildings—Materials—Construction—Ventilation—Drainage—Water supply—Dimensions of dairy, stables, cowsheds, yard, courts, and piggeries—Accommodation for power—Implement, machinery, and cart sheds—Hay and grain sheds—Shelter sheds—Storage of manure—Approximate cost of farm buildings for sizes of farms and system of farming.

(*b*) MACHINERY AND IMPLEMENTS.

9. *Power.*—The principle of action, construction, and method of working of steam, gas, and oil engines, petrol motors, and boilers—Estimation of the brake horse-power of engines—Care and management of engines and boilers—Power derived from water—Measurement of the quantity of water flowing in a stream—Water-wheels—Turbines—Pumps, principle of action and construction—Flow of water through pipes—Windmills—Cost and working expenses in connection with the above.

10. *Agricultural Machinery.*—The mode of action and the general principles involved in the construction and working of farm implements and machinery—Pulleys and belting—Power transmitted by belts—Toothed gearing—Shafting and bearings—Lifting appliances—Strength and care of chains—Lubrication—Construction of simple concrete foundations for engines and machines.

11. *Implements of Harvesting.*—Reaping machines—Mowing machines—Rakes—Tedders—Sweeps—Elevators—Potato raisers.

12. *Implements of Transit.*—Carts, waggons, rick lifters, traction engines, motors.

13. *Threshing and Food-preparing Machinery.*—Threshing machines, screens, winnowers—Hummelers, chaff cutters—Pulpers—Cake breakers.

14. *Dairy Appliances.*—Milking machines—Cream separators—Churns and other butter-working appliances—Milk delivery cans—Cheese-making utensils—Vats and presses.

N.B.—*Each Candidate should have with him at the Examination a pair of compasses, scales of equal parts, including a scale of one chain to an inch, and the scale fitting the Ordnance map,* $\frac{1}{2500}$ *or* 25·344 *inches to the mile, a small protractor, a set square, and a straight-edge about* 18 *inches in length.*

Candidates are expected to have had some experience with agricultural machinery and implements under actual working conditions, and to be capable of illustrating their answers, when necessary, by intelligible sketches or diagrams.

IV.—AGRICULTURAL CHEMISTRY.

1. *The Atmosphere.*—Its composition and relations to plant and animal life.

2. *Water.*—Rain water—Soil water and drainage—Drinking water—Sewage and irrigation.

3. *The Soil.*—Origin, formation, and classification of soils—Sampling—Analysis—Composition of soils—The chemical and physical properties of soils—The water and air of the soil—Biological changes in the soil—The soil in relation to plant growth—Fertility—Causes of infertility—Improvement of soils.

4. *Manures.*—Theories of manuring—Classification of manures—Origin, nature, and characteristics of manures—Manufacture of manures—Composition, analysis, adulteration, and valuation of manures—Farmyard manure and other natural manures—Green-manuring—Liming, marling, claying—Artificial manures, their origin and manufacture—Fertilisers and Feeding Stuffs Act—Sampling of manures.

5. *Poisons, Antiseptics, and Preservatives.*—General chemical composition and character of insecticides, fungicides, antiseptics, and preservatives used on the farm.

6. *Plants and Crops.*—Constituents of plants—Assimilation and nutrition of plants—Sources of the nitrogen and other constituents of plants—Germination—Action of enzymes—Composition and manurial requirements of farm crops—Food products derived from crops—Manuring experiments.

7. *Animals.*—Composition of animal body—Animal nutrition—Digestion—Assimilation, metabolism, respiration, and excretion.

8. *Foods and Feeding.*—Constituents of foods—Origin, nature, and composition of chief feeding-stuffs—Sampling, analysis, and adulteration of foods—Nutritive value and digestibility of food—Functions of chief food constituents—Energy values—Relation of foods to the production of work, meat, milk, and manure—Manurial residues of foods.

9. *Dairy Chemistry.*—The composition of milk, cream, butter, cheese, &c.—Conditions which influence the composition of milk and milk products—Action of ferments and enzymes on milk and milk products—Milk-testing—Analysis and adulteration of dairy products.

N.B.—*Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

V.—AGRICULTURAL BOTANY.

In addition to a general knowledge of the morphology, histology, and physiology of plants, candidates will be expected to possess a detailed knowledge of the following subjects:—

British grasses of agricultural importance: recognition of, at any stage of growth. Habitats of important species. Constitution of the grass flora of good meadows and pastures. Composition of seed mixtures for temporary and permanent leys on various soils. The effects of artificial manures on the flora of grass land.

The weeds of arable and grass land. Poisonous and parasitic weeds. Methods of distribution by seed and vegetatively · of eradication. Weeds as soil indicators. Recognition of the seeds of the common weeds, particularly those characteristically found in clover, grass, &c., seed.

The chief varieties of wheat, barley, oats, clovers, roots, and other farm crops: their suitability for various climatic and soil conditions. The identification of the more important types of cereals by means of their grain characters. Characteristics of good and bad samples of cereals.

Materials used in feeding-cakes and meals: identification of.

Grafting, pruning, and the management of orchards.

Plant-breeding. Principles of heredity in plants. Pure lines. Fluctuating variability. Selection.

Disease in plants. Diseases due to the attacks of parasitic fungi. Resistance to disease: conditions affecting. The life-history of the more important species of Plasmodiophora, Synchytrium, Phytophthora, Peronospora, Sphærotheca, Nectria, Claviceps, Sclerotinia, Ustilago, Tilletia, Puccinia, Polyporus, Armillaria, and of any fungoid diseases scheduled from time to time by the Board of Agriculture and Fisheries.

Yeasts and fermentation.

The general outlines of bacteriology: nitrogen fixation, nitrification, and denitrification. Putrefaction and the bacteriology of milk, butter, and cheese.

VI.—AGRICULTURAL BOOK-KEEPING.

Principles of book-keeping; single and double entry; opening books, description of subsidiary books, with examples of entries therein; the ledger; posting; preparation of trial balance; valuation of stocks and effects; closing and proving the books, preparation of profit and loss account and balance-sheet; ruling off accounts.

Application of special methods to farms of varying requirements.

VII.—AGRICULTURAL ZOOLOGY.

1. The part played by common animals in helping or hindering agricultural operations, as illustrated by moles and voles, insectivorous and other birds, snails and slugs, useful and injurious insects, arachnids and myriapods, earthworms, &c.

2. *General Structure of Insects*, especially the external characters.

3. *Life-history of Insects*—Economic importance of different stages. A knowledge of the life history of the principal insect pests as affording a basis for appropriate treatment.

4. *Classification of Insects.*—The general characters of the following Natural Orders: Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Orthoptera, Neuroptera.

5. *Acarina* injurious to Food Crops and Live Stock.

6. *Parasitic Worms.*—Flukes, Tapeworms, and Threadworms.

7. *Preventive and Remedial measures* in regard to insects, acarines, and worm Parasites—*e.g.*, farm practice in relation to the discouragement of Insect Attack. Encouragement of insect-eating birds and mammals. Artificial remedies Insecticides. Treatment for Parasites.

N.B.—*Practical acquaintance with common animals, especially insects and worm parasites, will be expected. Where the Candidate is not acquainted with the scientific name of an animal, the generally received English name will be accepted. Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

VIII.—VETERINARY SCIENCE.

1. Elementary Anatomy and Physiology of the horse, ox, sheep, and pig.

2. The general principles of breeding—including the physiology of reproduction, the laws of heredity, the periods of gestation, and the signs of pregnancy in the mare, cow, ewe, and sow.

3 Dentition as a means of determining the age of horses, cattle, sheep, and swine.

4 The management of farm stock in health and disease.

The following won the Diploma in 1920 :—

Diploma, with Honours.

1. William Caldwell, West of Scotland Agricultural College, Glasgow.
2. James Antony More, East of Scotland Agricultural College, Edinburgh.
3. Oliver Chance Cassels, Harper-Adams Agricultural College, Newport, Salop.

Diploma.

Margaret Mabel Farie Anderson, West of Scotland Agricultural College, Glasgow.
Frederick Thomas Bennett, 110 Basingstoke Road, Reading.
Frederick Christopher Bobby, Harper-Adams Agricultural College, Newport, Salop.
Robert Crawford Roger Boyd, West of Scotland Agricultural College, Glasgow.
Amy Margaret Braithwaite, University College, Reading.
James Bulloch, West of Scotland Agricultural College, Glasgow.
Lewis L. L. Cameron, North of Scotland Agricultural College, Aberdeen.
Geoffrey Fletcher Clay, Harris Institute, Preston.
Harry Samuel Cuthbertson, Royal College of Science, Dublin.
James Fairweather, North of Scotland Agricultural College, Aberdeen.
Florence Dorothy Hawes, University College, Reading.
David Hendry, West of Scotland Agricultural College, Glasgow.
William Fairbairn Hesling, Harper-Adams Agricultural College, Newport, Salop.
Thomas Hunter, West of Scotland Agricultural College, Glasgow.
Jorian Edward Forwood Jenks, Harper-Adams Agricultural College, Newport, Salop.
David Percival Johnston, Royal College of Science, Dublin.
Percy Albert Keen, Harris Institute, Preston
Douglas M'Hardy, South-Eastern Agricultural College, Wye, Kent.
John Moresby Moresby-White, New College, Oxford.
Thomas Goodall Mountford, Harper-Adams Agricultural College, Newport, Salop.
Borland Pitt, West of Scotland Agricultural College, Glasgow.
Mary Shumla Ridout, Harper-Adams Agricultural College, Newport, Salop.
Roger Sayce, Harris Institute, Preston, and University of Leeds.
William Ronald Seward, South-Eastern Agricultural College, Wye, Kent.
Thomas Sharvin, Royal College of Science, Dublin.
Thomas John Stewart Smellie, West of Scotland Agricultural College, Glasgow.
Daniel Murray Smillie, West of Scotland Agricultural College, Glasgow.
James Steele, West of Scotland Agricultural College, Glasgow.
Ernest Leonard Taylor, Harris Institute, Preston.
James Francis Herbert Thomas, University College, Reading.
James L. Tindal, Jun., West of Scotland Agricultural College, Glasgow.
Frederick Whittle, Harris Institute, Preston.

Examination Papers of Past Years.

Copies of the Papers set at the Annual Examination for the National Diploma in the Science and Practice of Agriculture held in 1920 may be had upon application. Price 6d. per set.

VETERINARY DEPARTMENT

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become Members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of Students who passed for the Society's Certificate is 1183.

The Society votes annually eleven silver medals for Class Competition to each of the two Veterinary Colleges in Scotland, the one in Edinburgh and the other in Glasgow.

FORESTRY DEPARTMENT

The Society grants First and Second Class Certificates in Forestry.

1. An Examination will be held each alternate year about the month of April.
2. The next Examination will be held at 3 George IV. Bridge, Edinburgh, in the month of March 1922, provided a sufficient number of candidates present themselves for examination.
3. Candidates must possess—1. A thorough acquaintance with the theory and practice of Forestry. 2. A general knowledge of the following branches of study, so far as these apply to Forestry: (*a*) The Elements of Botany and Forest Zoology; (*b*) The Elements of Physics, Chemistry, and Meteorology; (*c*) Forest Engineering, including Land and Timber Measuring and Surveying; Mechanics and Construction, as applied to fencing, draining, bridging, road-making, and saw-mills; and Implements of Forestry; (*d*) Book-keeping and Accounts.
4. The examinations are open to candidates of any age, may be both written and oral, and will include such practical tests as may from time to time be decided to apply.
5. The maximum number of marks for each subject is 100; Pass marks for First-Class Certificate—Forestry, 75; all other subjects, 60. Pass marks for Second-Class Certificate—Forestry, 60; all other subjects, 50.
6. A Candidate who obtains Pass marks in certain subjects, but fails in others, may come up for these other subjects alone, it being understood that without the special permission of the Society no Candidate will be eligible to enter for more than two subsequent examinations.
7. A Candidate who has obtained the Second-Class Certificate may enter again for the First-Class Certificate.

The list of students who obtained certificates prior to 1899 appears in the 'Transactions,' Fifth Series, vol. xi. (1899).

The following have since obtained First-Class Certificates:—

Eric Arthur Nobbs, Department of Agriculture, Cape Town,	1899
George Potts, Grey College, Bloemfontein, Orange River Colony,	1899
Duncan S. Rabagliati, 1 St Paul's Road, Bradford,	1901
Frank Scott, Dumfries House Mains, Cumnock,	1903
William T. Stockley, Rose Villa, Garswood, near Wigan,	1906
A. Frank Wilson, C.D.A. (Edin.), Reedieleys, Auchtermuchty,	1907
George Fisher, Farm Brook, Pilling, Garstang, Lancs.,	1909
John Patten, jun., Hulne Park, Alnwick,	1909
Alexander Mitchell, Dalmeny Park, Edinburgh,	1909
John D. Davidson, Brimstage, Birkenhead,	1911
Donald Doull, M.A., A.R.C.Sc., High School, Kelso,	1911
James W. Mackay, Jervaulx Abbey, Middleham, Yorks.,	1915
Harry Watson, Darnaway, Forres,	1915
Reginald Watt Hunter, 94 St George's Terrace, Newcastle-on-Tyne,	1919

The following have since obtained Second-Class Certificates:—

William Bruce, B.Sc., East of Scotland College of Agriculture, Edinburgh,	1901
Rajappier Swaminathan, 56 Jesus Lane, Cambridge,	1901
Thomas Usher, Courthill, Hawick,	1901
Allan Carruth, Lawmarnock, Kilbarchan,	1905
Alex. M. Lumsden, Newburn Schoolhouse, Upper Largo,	1905
Robert M. Wilson, Laws Cottage, Duns,	1905
Thomas Campbell, Greystoke, Penrith,	1906
Donald Ferguson, Quarry Lane, Lennoxtown,	1906
Charles Penrhyn Ackers, Huntly Manor, Gloucester,	1908
Robert Howie, Beechwood, Arbroath,	1908
John Trotter, D.Sc., 22 West Savile Terrace, Edinburgh,	1908
James A. S. Watson, Downieken, Dundee,	1908
Norman H. Pearson, 52 Percy Park, Tynemouth,	1909
Lionel F. Stobart, Royal Agricultural College, Cirencester,	1911
Alexander George Norrie, Cairnhill, by Turriff,	1913
William Watt, Darnaway, Forres,	1913
William P. Greenfield, 6 Littlefield Lane, Grimsby,	1915

SYLLABUS OF EXAMINATION

I.—SCIENCE OF FORESTRY AND PRACTICAL MANAGEMENT OF WOODS.

I. *Principles of Scientific Forestry.*—1. Effects of heat, light, moisture, and air-currents on forest vegetation. 2. Effects of depth, porosity, moisture, and chemical composition of the soil on forest vegetation. 3. Effects of forest vegetation on the soil and air. 4. Rate and extent of development, longevity, and reproductive power of trees. 5. Pure and mixed woods. 6. Systems of sylviculture.

II. *Forest Organisation.*—7. General ideas regarding a regulated system of forest management. 8. Knowledge of working plans of forests.

III. *Practical Management of Woods.*—9. Draining and irrigation. 10. Choice of species for various situations. 11. Seed and sowing, including nurseries. 12. Planting. 13. Natural regeneration by seed, shoots, and suckers. 14. Formation of mixed woods. 15. Tending of young woods. 16. Pruning. 17. Thinning. 18. Sylvicultural characteristics of the principal trees.

IV. *Injuries by Storms and Fires.*—19. Storms. 20. Fires.

V. *Timber.*—21. Its technical properties. 22. Its defects. 23. Recognition of different kinds of timber. 24. Processes for increasing its durability.

VI. *Utilisation of Produce.*—25. Uses of wood and other produce. 26 Felling. 27. Conversion. 28. Seasoning. 29. Transport. 30. Sales. 31. Harvesting of bark.

II.—FOREST BOTANY AND FOREST ZOOLOGY.

(*a*) Forest Botany.

The fundamental facts of morphology, physiology, and classification of plants. The structure and function of the plant-cell and the plant-tissues. Their primary distribution The secondary changes they exhibit in consequence of perennation.

The structure and function of the root and shoot in flowering-plants Buds, their forms and uses The flower. The fruit. The seed.

The structure and function of vegetative and reproductive organs of fungi.

Relationship of plants to air, soil, and water. Effect of light, heat, and mechanical agencies upon plants. Nutrition. The nature and elements of the food of plants. Sources of plant-food. The absorption, elaboration, transference, and storage of food. Respiration and transpiration. Parasites and saprophytes. Symbiosis.

Growth of plants in length and thickness. Correlation of growth, pruning. Germination of seeds. Formation of wood and bark. Healing of wounds.

Diseases of plants due to faulty nutrition and unfavourable circumstances of growth. Diseases due to attacks of fungi.

Natural reproduction and propagation by seeds and by buds. Fertilisation of flowers. Hybridisation. Artificial propagation by budding, grafting, layering, and cutting.

The characters of the large groups and classes of the vegetable kingdom. The characters of the families of plants which include the chief timber trees. The botanical characteristics of the principal British forest-trees (including the structural features of their wood). The weeds of the forest and their significance.

(*b*) Forest Zoology.

The group Insecta: its position in the animal kingdom. Structure, mode of reproduction, and metamorphosis of insects. The outlines of classification of the group. Conditions favourable to the numerical increase of insects. Natural checks to increase (*e.g.*, birds, mammals, parasitic insects). The identification and life-history of the more important insects injurious to forest trees and fruit trees. The damage caused by these insect pests and their mode of attack. The damage caused by animals. Preventive and remedial measures.

III.—PHYSICS, CHEMISTRY, AND METEOROLOGY.

Physics.

Mass, weight, specific gravity, solid, liquid, and gaseous states of matter. Capillarity, osmose, vapour tension, suction pump, force pump, syphon, barometer, atmospheric pressure. Boyle's law. Levers and pulleys Heat, measurement of heat, specific heat; transference of heat by conduction, convection, and radiation. Boiling and freezing. Latent heat. The thermometer. The conservation and transformation of energy. Light—reflection, refraction, polarisation; the spectrum. The rudiments of electricity and magnetism.

Chemistry.

Elements. Oxygen, hydrogen, nitrogen,—their preparation, properties, and chief compounds. Acids, bases, salts. Combustion, oxidation, reduction Sulphur, carbon, phosphorus; and their compounds, with oxygen and hydrogen. Metals—potassium, sodium, calcium, magnesium, aluminium, iron, copper, lead, mercury, and their chief compounds Carbohydrates, marsh gas, olefiant gas, alcohol, acetic acid, oxalic acid. Distillation of wood and coal.

Meteorology.

The atmosphere, its composition and physical properties. Measurement of pressure and temperature. The barometer. Rain, hail, snow, fog, cloud, dew, the dew-point, hoar frost. The weathering of rocks and soils Gases injurious to vegetation.

IV—FOREST ENGINEERING, INCLUDING LAND AND TIMBER MEASURING AND SURVEYING; MECHANICS AND CONSTRUCTION AS APPLIED TO FENCING, BRIDGING, ROAD-MAKING, AND SAW-MILLS.

1. The use of the level and measuring-chain. Measuring and mapping surface areas. 2. The measurement of solid bodies—as timber, stacked bark, fagots, &c., earthwork. 3. The different modes of fencing and enclosing plantations; their relative advantages, durability, cost of construction, and repairs. 4. The setting out and formation of roads for temporary or permanent use. 5. The construction of bridges over streams and gullies; of gates or other entrances. 6. The construction and working of estate saw-mills.

V.—ARITHMETIC—BOOK-KEEPING.

1. Arithmetic—including Practice, Proportion, and Decimal Fractions. 2. Book-keeping—including the description of books to be kept, and the solution of practical questions in Book-keeping and the preparation of Accounts.

EXAMINATION PAPERS, 1919.

PRACTICAL FORESTRY.

1. Describe the working plan of any woodland with which you are familiar, drawing attention to any defects, and point out how these might be remedied.

2. How would you be guided in deciding what species of trees you would select (*a*) to re-stock a newly cleared area, (*b*) to plant a stretch of rough hill pasture of varying quality?

3. In planting an area of 200 acres with Larch, Corsican Pine, Spruce, Sitka Spruce, and Douglas, how would you proceed to make the most of each species? Name any other species you would introduce, and give your reasons for doing so.

4. (*a*) What benefits are derived from drainage, and what method and system of drainage would you adopt (1) on gently sloping peaty land, (2) on a wet clay loam steep slope? (*b*) What are the objects and benefits of thinning?

5. (*a*) How would you know if a wood (1) 20 years old, (2) 50 years old, had a satisfactory degree of density? (*b*) What effect has under-stocking (1) on the individual tree, (2) on the crop in general? (*c*) How would you treat a 15-year-old plantation composed of an irregular mixture of Larch, Scots Pine, Spruce, and Douglas?

6. Describe the plant you would recommend for an extensive property, having a good working plan for the woods, containing an abundance of varied marketable timber, which it is proposed will be utilised, as far as required, for estate purposes. How would you dispose of surplus timber?

(*Three hours allowed.*)

FOREST BOTANY AND FOREST ZOOLOGY.

(*A*) FOREST BOTANY.

(Four *questions only to be attempted.*)

1. Give a general account of the Order Cupuliferæ.

2. Compare and contrast in structure the young root and young stem of a Dicotyledonous plant.

3. Describe carefully, with drawings, the male and female cones of the Pine.

4. What are the three worst fungus enemies of the trees in your district? Write a life-history of one of them.

5. How does a tree get its water-supply? What are the conditions that determine the intake of water, and what is the importance of water to the tree?

(*B*) FOREST ZOOLOGY.

(Two *questions only to be attempted.*)

1. Name two common Scale Insects on forest trees, and describe in detail one of them.

2. What animals might be present underneath the bark stripped from a dead or dying piece of pine stem? Add a note on each of them.

3. Compare and contrast a sawfly and a wood-wasp under the heads—
   (*a*) external appearance of the adult;
   (*b*) the larva;
   (*c*) the damage done.

(*Two and a half hours allowed.*)

PHYSICS, CHEMISTRY, AND METEOROLOGY.

1. Explain the meaning of the terms "acids, bases, and salts." Describe the properties of each class, and give examples from substances containing calcium and phosphorus.

2. Describe how the destructive distillation of wood may be carried out. State briefly what you know of the composition and value of the distillate. Compare the volatile products with those obtained from the destructive distillation of coal.

3. What is meant by atmospheric pressure, and how would you determine it? Is atmospheric pressure constant, and if not, what are the chief causes of its variation in any locality?

4. What do you understand by the term "element"? Name the chief properties of elements, classifying into groups those with like properties.

5. Name the chief factors which operate in bringing about the reduction of rocks to soil. Describe separately the mechanical and chemical agencies, and give an example of the operation of each in the process of weathering.

(An hour and a half allowed.)

FOREST ENGINEERING.

1. The following notes from a Field Book refer to measurements taken for the purpose of estimating the quantity of earth to be excavated in connection with the construction of a road.

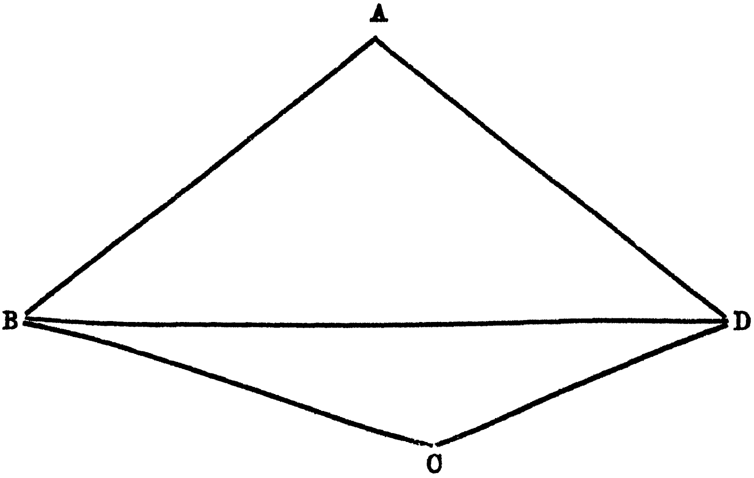
One side is vertical, and the opposite side has a slope of 1½ to 1. The width at the bottom is 18 feet, and the total length is 210 feet, which may be assumed to be divided into three equal parts, and the measurements made at the middle of each part.

Make a dimensioned sketch of each section, and calculate the total amount of earth to be excavated in cubic yards.

Rise.	B.S.	I.S.	F.S.	Fall.	Reduced Level.	Remarks.
	12·86				O.	1st Section.
		8·26				
		6·59				
			5·85			
	10·96				O.	2nd Section.
		7·03				
		6·99				
			6·72			
	8·90				O.	3rd Section.
		6·84				
		7·05				
			6·26			

2 Draw the plan of a field from the following notes to a scale of 1 chain to the inch, and find the area of the field (see fig 1).

Fig. 1.



Also measure the length of the perpendicular from A to BD.

	Links
	⊙ D
	820
	630
0	500
45	390
30	250
	⊙A

	⊙ A
	760
42	450
25	310
	⊙ B

⊙ D
[illegible]40
⊙ C
⊙ C
610
⊙ B
⊙ B
1050
⊙ D

3. Make up the following Level Book. Plot the section to a horizontal scale of 1 inch to 1 chain and a vertical of 1 inch to 10 feet.

Rise.	B S.	I S.	F.S.	Fall.	Reduced Level.	Distance Links.	Remarks.
	1·52				30		B M.
	7·48		8 62			0	O A
		10·71				120	
	5 91		13 56			250	
		8·65				340	
	9·44		6·37			480	
		8·13				580	
		6·28				680	
	8·38		4 19			800	
		5 41				930	
		3 25				1050	
	6 65		0·73			1200	
		8·29				1360	
			11·53			1550	O B

4. Describe, with the aid of diagrams, how you would proceed in the field in order to find the height of an object—

(*a*) The base of which you can approach.

(*b*) The base of which is inaccessible.

5. Give dimensioned sketches, showing in cross-section a macadamised road—

(*a*) On a bank;

(*b*) In a cutting;

(*c*) On the side of a hill having a steep sidelong slope.

How would you provide for drainage?

6. Describe and sketch the general arrangement of a portable saw-milling plant.

How is the timber brought to, and taken from, the saw?

ARITHMETIC AND BOOK-KEEPING.

I. Arithmetic.

1. A piece of timber is 19 feet 6 inches long, 16 inches broad, and 10½ inches deep. Its cost is £2, 11s. 6d. Find the cost per cubic foot, stating the pence to three places of decimals.

2. Find by practice the value of 211 tons 11 cwt. 37 lb. @ 9s. 4d. per cwt.

3. A purchases a quantity of timber and sells it to B at a profit of 8 per cent. B sells the same timber to C at a profit of 10 per cent. What profit per cent would A have made if he had sold the timber direct to C at a price the latter paid to B? State your answer in decimals.

4. A rectangular piece of ground 200 yards long and 80 yards broad is to be planted with young trees. The trees are to be 12 feet apart, and there is to be a space of 6 feet between the outermost trees and the boundaries. How many trees are required?

II. Book-keeping.

You are the forester on the estate of Craigbeck. At 1st June 1914 the balance in bank was £53, while the cash on hand was £7, and there was a sum of £159 due to the estate by Alexander Black. The following are your transactions during the month of June 1914:—

1914.
June 1. Sold to Alexander Black on credit 1000 larch trees @ 8s. 6d.
" 2. Paid cash for carriage, to be recovered from Alexander Black, £5.
" 4. Sent cheque to Peter Jones in settlement of his account of £40 for implements, less discount at 5 per cent.
" 7. Received rent of cottage, £8 in cash.
" 9. Purchased from Alexander Black a brown horse, the price of which, £40, it is arranged shall be set against his account.
" 11. Received from auctioneer and paid into bank cheque p. £155, being net proceeds of sales by him.
" 15. Received and paid into bank Alexander Black's cheque in settlement of his account to date, allowing him £5 discount.
" 18. Sent to proprietor cheque p. £250.
" 23. Paid for young trees by cheque, £18.
" 30. Drew from bank £20.
Paid salary and wages, £17.

(1) Write up Alexander Black's account in the Ledger.

(2) Write up the cash book, keeping separate columns for bank, cash, and discount, and showing the balances in bank and on hand at 30th June.

(One hour and a half allowed.)

DAIRY DEPARTMENT

EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

This Examination, instituted in 1897, is conducted by the National Agricultural Examination Board, appointed jointly by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland.

REGULATIONS.

1. The Societies may hold annually in England and in Scotland, under the management of the National Agricultural Examination Board appointed by them, one or more Examinations for the National Diploma in the Science and Practice of Dairying; the Diploma to be distinguished shortly by the letters "N.D.D."

2. The Examinations will be held on dates and at places from time to time appointed and duly announced.

3. A non-returnable fee of *Three Guineas* will be required from each candidate.

4. Forms of Entry for the Examination in England may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C. 1," and must be returned to him duly filled up, with the entry-fee of £3, 3s., on or before August 13, 1921.

5. Forms of Entry for the Examination in Scotland may be obtained from "The Secretary, Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh," and must be returned to him duly filled up, with the entry-fee of £3, 3s., on or before August 13, 1921.

6. A candidate may enter for the Examination either in England or Scotland, but not in both, and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versâ*.

7. As a preliminary to the acceptance of an application for permission to enter for the Examination, a candidate must produce:—

(1) A certificate testifying that he or she has received at least *SIX* session months instruction (not necessarily continuous) in practical dairy work at an approved Dairy training institution.

(2) Evidence that he or she has spent at least SIX months on an approved Dairy farm (which period must not run concurrently with that referred to in sub-section 1), and that he or she has taken part in the work.

(3) Certificates in a prescribed form, from a recognised institution (or recognised institutions) showing that he or she has attended approved courses in Chemistry, Bacteriology, and Botany, and has satisfied the authorities of the institution of his (or her) fitness for admission to the Examination.

8. In the Examination a candidate will be required to satisfy the Examiners, by means of written papers, practical work, and *vivâ voce*, that he or she has—

(1) A general knowledge of the management of a Dairy Farm, including the rearing and feeding of Dairy Stock, the candidate being required to satisfy the Examiners that he or she has had a thorough training and practical experience in all the details of Dairy work as pursued on a farm.

(2) A thorough acquaintance, both practical and scientific, with everything connected with the management of a Dairy, and the manufacture of Butter and Cheese.

(3) Practical skill in Dairying, to be tested by the making of Butter and Cheese.

NOTE.—A candidate must be prepared to make any one of the following varieties of Hard-pressed Cheese, the Examiner in Cheesemaking having the option of saying during the Examination what variety a candidate shall make:—

AT THE ENGLISH CENTRE—Cheddar, Cheshire, or Derby.

AT THE SCOTTISH CENTRE—Cheddar, Dunlop, or Cheshire.

(4) Capacity for imparting instruction to others.

9. The Board reserve the right to postpone, to abandon, or in any way, or at any time, to modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

DATES OF EXAMINATIONS IN 1921.

ENGLAND—FRIDAY, September 9th, and following days, at the University College and British Dairy Institute, Reading; last date for receiving applications, SATURDAY, August 13th.

SCOTLAND—FRIDAY, September 23rd, and following days, at the Dairy School for Scotland, Kilmarnock; last date for receiving applications, SATURDAY, August 13th.

SYLLABUS OF SUBJECTS OF EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

I.—GENERAL MANAGEMENT OF A DAIRY FARM.

1. *General Management of Pastures and Crops on a Dairy Farm.*

2. *Buildings.*—Situation, Surroundings, Construction, Ventilation, and Drainage of Farm Buildings. Suitability of building materials. Water supply. Construction and arrangement of Dairies: (*a*) for General Purposes; (*b*) for Special Purposes.

3. *Foods and Feeding.*—Summer and Winter Feeding of Dairy Cattle. Root crops. Green fodder. Ensilage. Different kinds of food and their composition. Their effect upon Milk, Butter, and Cheese. Special Foods used in Dairy Feeding. Preparation of food for Dairy Stock. Rearing and feeding of young Stock. Feeding and management of Pigs and Poultry.

4. *Dairy Cattle in Health and Disease.*—Characteristics of different Breeds, and choice of Dairy Cattle. General functions of the organs of the animal body. Breeding. Parturition. Organs which secrete milk. Process of milk secretion. Changes which food undergoes during digestion. Diseases of Dairy Cattle and their remedies.

II.—MANAGEMENT OF DAIRY.

1. *Milk and Cream.*—Process of Milking. Dairy Utensils and Appliances, hand and power. Cooling of Milk. Separation and ripening of Cream. Different systems of Cream-raising. Utilisation of Skim-milk. Keeping of Milk. Importance of Cleanliness. Diseases spread by Milk. Conveyance and sale of Milk. Milk records. Keeping of Dairy and Farm Accounts. Creameries. Butter and Cheese Factories. Different systems of Dairying and their comparative returns.

2. *Butter.*—Churns and other Butter-making appliances, hand and power. Souring of Cream. Churning. Washing and working of Butter. Butter-milk. Packing and transmission of Butter. Salting and keeping of Butter. Colouring. Characteristics of good Butter.

3. *Cheese*—Principles of its manufacture. Making of different kinds of Cheese (from cream, whole-milk, and skim-milk). Acidity of Milk. Use of Rennet and its substitutes. Whey. Appliances for Cheese-making. Ripening and storage of Cheese. Packing and sale of Cheese. Making of Cream and other soft Cheeses.

III.—CHEMISTRY AND BACTERIOLOGY.

[*N.B.*—In this Section there will be expected of the candidate a sound understanding of the scientific principles underlying the practice of Dairying, a knowledge of the composition, nature, properties, and changes undergone by the different substances met with in Dairying, and a general acquaintance with the principles of laboratory methods so far as Dairying is concerned.]

1. *General Principles of Chemistry.*—The nature of elements and compound bodies. The different forms of matter—solid, liquid, gaseous. Specific gravity, and instruments for determining it. Temperature, and methods of measuring it. Thermometric scales. The influence of temperature in Dairy operations. Physical and chemical changes involved in the following: solution, precipitation, filtration, distillation, oxidation, and reduction. Acids, Bases, Salts—their distinctive properties. Acidity and Alkalinity—their influence and quantitative estimation.

The Atmosphere—its constituents and impurities; its influence on Dairy operations. Atmospheric pressure.

Water—constituents of pure and natural waters. The impurities of water, and whence derived. The importance of a pure water supply in Dairying.

General knowledge of the elementary chemistry of the following substances and their compounds so far as met with in Dairying: Potash, Soda, Ammonia, Lime, Phosphoric Acid, Alcohol, Acetic Acid, Carbonic Acid, Butyric Acid, Lactic Acid, Albumen, Casein, Fats, Milk-sugar, Glycerine, Pepsin.

Saponification of Fats.

2. *Milk and its Products.*—The nature, composition, properties, and chemical constituents of milk. Microscopical appearances presented by milk. The circumstances that affect the quality and quantity of milk produced by the cow. The influence of feeding. The changes which occur in the keeping of milk, and how produced. The natural and artificial souring of milk. Rennet, its nature and use. Physical and chemical changes involved in the making and keeping of Butter, and in the manufacture and ripening of Cheese. Separated Milk, Condensed Milk, Fermented Milk. The use of Preservatives. Methods of Milk-testing—Mechanical methods, their theory and practice. A general knowledge of the methods employed in the chemical analysis of Milk and Butter. Adulteration of Milk, Cream, Butter, and Cheese—the ways in which adulteration is practised, the changes in composition thereby produced, and a general knowledge of the methods employed in detecting the same.

3. *The Chemistry of Feeding.*—The principal constituents of Food materials, and the functions they severally fulfil. The influence of Food constituents on milk production. Assimilation and Digestion. Animal Heat and Respiration. Milk as a Food. The relation of Food to Manure.

4. *Bacteriology.*—Moulds. Yeasts. Bacteria. The principal kinds of Bacteria met with in Dairying—their forms, methods of reproduction, and conditions of life. The influence of physical agencies upon Bacterial life. Air and Water as carriers of Bacteria. The changes produced by Bacteria in milk and its products. Useful forms and their functions. Harmful forms and their effects—Coagulation, Discoloration, Taints, &c. Pathogenic organisms. The classification of organisms—organised ferments and enzymes. The isolation of Bacteria. Methods of preparation of pure cultures and their practical use. Nutritive media. Soil Bacteriology—Assimilation of Nitrogen by Plants—Nitrification—Denitrification. Pasteurisation and Sterilisation—the practical application of these to Dairy matters. Fermentation and Putrefaction. Disinfectants and Preservatives.

N.B.—*Candidates are required to bring their Laboratory Notes to the Oral Examination in this subject.*

IV.—PRACTICAL SKILL IN DAIRY WORK.

Candidates must be prepared—(1) to produce at or before the Examination a satisfactory certificate of proficiency in the Milking of Cows, signed by a practical Dairy Farmer, and to satisfy the Examiners by a practical test, if so required; (2) to churn and make into Butter a measured quantity of Cream; and (3) to make one Cheese of each of the following varieties: (i) *Hard-pressed, of not less than 30 lb.; (ii) Veined or blue-moulded, of not less than 10 lb.; and (iii) also to make one or other of the following Soft Cheeses: Cambridge, Camembert, Coulommier, or Pont l'Evêque.

* A candidate must be prepared to make any one of the following varieties of Hard-pressed Cheese:—

ENGLISH STUDENTS—Cheddar, Cheshire, or Derby.

SCOTTISH STUDENTS—Cheddar, Dunlop, or Cheshire.

The Examiner in Cheesemaking will intimate the kind of Cheese to be made during the Examination.

V.—CAPACITY FOR IMPARTING INSTRUCTION TO OTHERS.

Candidates must also show practically that they are familiar with the management of a Dairy, and are capable of imparting instruction to others.

The following obtained the Diploma in Scotland in 1920 :—

Diploma with Honours.

1. JAMES ANTHONY MORE, East of Scotland College of Agriculture, Edinburgh.
2. DANIEL MURRAY SMILLIE, West of Scotland Agricultural College, Glasgow.
   GEOFFREY FLETCHER CLAY, Harris Institute, Preston.
4. JAMES LOVE TINDAL, Jun., West of Scotland Agricultural College, Glasgow.
5. ANDREW WILSON PATERSON, West of Scotland Agricultural College, Glasgow.
6. ELLA MARGARET MONIE, West of Scotland Agricultural College, Glasgow.

Diploma.

MARGARET MABEL FARIE ANDERSON, West of Scotland Agricultural College, Glasgow.
JOHN ARMOUR, West of Scotland Agricultural College, Glasgow.
ALEXANDER BRUCE DICKSON, West of Scotland Agricultural College, Glasgow.
LEOPOLD A. LIVENTHAL, University College, Cardiff.
KATHERINE McINNES, West of Scotland Agricultural College, Glasgow.
MILLICENT MOIR, North of Scotland College of Agriculture, Aberdeen.
CHARLOTTE REID, North of Scotland College of Agriculture, Aberdeen.
JAMES STEELE, West of Scotland Agricultural College, Glasgow.
DIANA YVONNE ELISE WATT, West of Scotland Agricultural College, Glasgow.
GWYNETH SARAH WILLIAMS, University College, Cardiff.

The following obtained the Diploma in England in 1920 :—

Diploma with Honours.

1. IRENE E. SMALE, University College and British Dairy Institute, Reading.
2. ANNIE SHEPPARD, Midland Agricultural and Dairy College, Kingston, Derby.
   ELIZABETH MARJORY SPURR, Midland Agricultural and Dairy College, Kingston, Derby.
4. CHARLES MONTAGUE SELBY, University College and British Dairy Institute, Reading.

Diploma.

EVELYN MURIEL ALLDAY, Midland Agricultural and Dairy College, Kingston, Derby.
MARGARET EDITH ANDREWS, University College and British Dairy Institute, Reading.
GRACE BOWDEN, University College and British Dairy Institute, Reading.
WINIFRED BRENNAN, University College and British Dairy Institute, Reading.

Esther Broadbent, Uuiversity College and British Dairy Institute, Reading.

Edith Bucknell, University College and British Dairy Institute, Reading.

Gladys Lynette Connolly, University College and British Dairy Institute, Reading.

Doris Margaret Cumming, Lancashire County Council Dairy School, Hutton, Preston, and British Dairy Institute, Reading.

Trayko Dayitch, University College and British Dairy Institute, Reading.

Alice Eastman, University College and British Dairy Institute, Reading.

Eileen Wilson Erskine, University College and British Dairy Institute, Reading.

Annie Harrison, University College and British Dairy Institute, Reading.

Annie Dorothy Jones, University College, Aberystwyth, and British Dairy Institute, Reading.

Hilda Annie Jones, University College, Aberystwyth, and British Dairy Institute, Reading.

Katie Jones, University College, Aberystwyth, and British Dairy Institute, Reading.

Kathleen L. Lomax, Midland Agricultural and Dairy College, Kingston, Derby.

Jessie Matthews, Midland Agricultural and Dairy College, Kingston, Derby.

Helen Mary Hector Morice, The College, Studley, Warwickshire.

Frances Ethel Nevill, Midland Agricultural and Dairy College, Kingston, Derby.

Agnes Sybil Price, University College, Aberystwyth, and British Dairy Institute, Reading.

Kathleen Pritchard, University College and British Dairy Institute, Reading.

Dorothy Clayton Smith, University College and British Dairy Institute, Reading.

Herbert William Tomlinson, University College and British Dairy Institute, Reading.

Donald Joseph Vaux, University College and British Dairy Institute, Reading.

Jessie H. Williams, University College and British Dairy Institute, Reading.

Olive Windebank, University College and British Dairy Institute, Reading.

Examination Papers of Past Years.

Copies of the Papers set at the Annual Examinations for the National Diploma in the Science and Practice of Dairying, held from 1910 to 1920, may, so far as available, be had on application. Price 6d. per set.

CHEMICAL DEPARTMENT

Chemist to the Society—J. F. Tocher, D.Sc., F.I.C., Crown Mansions, 41½ Union Street, Aberdeen.

The object of the Chemical Department is to promote the diffusion of a knowledge of Chemistry as applied to agriculture among the members of the Society, to carry out experiments for that purpose, to assist members who are engaged in making local experiments requiring the direction or services of a chemist, to direct members in regard to the use of manures and feeding-stuffs, to assist them to put the purchase of these substances under proper control, and in general to consider all matters coming under the Society's notice in connection with the Chemistry of Agriculture.

MEMBERS' PRIVILEGES IN RESPECT TO ANALYSES.

MANURES, FEEDING-STUFFS, SOILS, AND AGRICULTURAL PRODUCTS.

The fees for analyses made for members of the Society shall, until further notice, be as follows:—

The determination of one ingredient in a single sample of a *manure* or of a *feeding-stuff*, ...	5s.
The determination of two or more ingredients in a single sample of a *manure* or of a *feeding-stuff*, ...	10s.

For example—

Linseed and other cakes, for oil or for albuminoids, .	5s.
Feeding-meals, ground cereals, for oil or for albuminoids, .	
Bone-meals, for nitrogen or for phosphate, . .	
Compound manures, for nitrogen or for soluble phosphates, or for insoluble phosphates or for potash, . .	
Superphosphate, for soluble phosphate or for insoluble phosphate, ...	
Thomas-phosphate powder, for citric soluble phosphate or for total phosphate, ...	
Linseed and other cakes, for oil and albuminoids, &c., .	10s.
Feeding-meals, ground cereals, for oil, albuminoids, &c., .	
Bone-meals, for nitrogen, phosphate, &c., ...	
Compound manures, for nitrogen, soluble phosphates, insoluble phosphates, and potash, ...	
Superphosphate, for soluble phosphate and insoluble phosphate, ...	
Thomas-phosphate powder, for citric soluble phosphate and total phosphate, ...	

Limestone, giving the percentage of lime, ...	£0	5	0
Limestone, complete analysis, ...	1	0	0
Lime, including ground lime, percentage of alkaline lime,	0	5	0
" " " complete analysis, . .	1	0	0
Analysis of soil, to determine fertility and recommendation of manurial treatment, ...	1	10	0
Complete analysis of soil, ...	2	10	0
Analysis of agricultural products—hay, grain, ensilage, roots, &c., ...	1	0	0

These charges apply only to analyses made for agricultural purposes, and for the sole and private use of members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

Valuations of manures, according to the Society's scale of units, will be supplied if requested.

DAIRY PRODUCE.

Milk, full analysis,	£0	10	0
" solids and fat,	0	5	0
" fat only,	0	2	6
Butter, full analysis,	0	10	0
" partial analysis (water and fat),	0	5	0
Cheese,	0	10	0

WATER.

Analysis of water[1] to determine purity and fitness for domestic use (the Committee reserve power to refuse from one member more than two samples annually at the reduced fee)................at the reduced fee of	1	0	0

MISCELLANEOUS.

Search for poisons in food or viscera,	2	0	0
Sulphate of copper, percentage of copper and purity,	0	5	0
" " complete analysis,	0	10	0
Arsenic, carbolic acid and tar acids, and other poisons used in making sheep dips, insecticides, &c.,	5s. to £1		

Samples should be sent (carriage paid) to Dr J. F. Tocher, Crown Mansions, 41½ Union Street, Aberdeen.

Note to Members sending Samples for Analysis.

The Directors are anxious to take any steps in their power to expose the vendors of inferior fertilisers and feeding-stuffs, and the members can give them assistance in this by supplying to the chemist, when sending samples for analyses, information as to the guarantee, if any, on which the goods were sold, and also as to the price charged.

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Any method of sampling mutually agreed upon between buyer and seller may be adopted, but the following method is recommended as a very complete and satisfactory one: Four or more bags should be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about half a pound each should be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses (due notice having been given to the seller of the time and place of sampling), and these samples should be taken as quickly as possible, and put into bottles or tin cases to prevent loss of moisture, and having been labelled, should be sealed by the samplers—one or more samples to be retained by the purchaser, and one to be sent to the chemist for analysis.

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[1] Cases containing bottles for water samples and instructions for sampling are sen from the laboratory on application

FEEDING-STUFFS.

Samples of feeding-stuffs which are in the form of meal may be taken in a similar manner.

Samples of cake should be taken by selecting four or more cakes from the bulk. These should be nutted to a size not larger than walnuts. The nutted cake should then be thoroughly mixed and samples of not less than one pound each taken from it. The samples should be put into bottles or tins, sealed up, and labelled. One sample should be sent to the analyst, and one or more duplicates retained by the purchaser.

SOILS.

Dig a little trench about two feet deep, exposing the soil and subsoil. Cut from the side of this trench vertical scrapings of the soil down to the top of the subsoil. Catch these on a clean board, and collect in this manner two pounds of soil taken from the whole surface of the section. Similar scrapings of subsoil immediately below should be taken and preserved separately. Five or six similarly drawn samples at least should be taken from different parts of the field, and kept separate while being sent to the chemist, that he may examine them individually before mixing in the laboratory.

VEGETABLE PRODUCTS.

Turnips, &c., at least 50 bulbs carefully selected as of fair average growth.

Hay, straw, ensilage, &c., should be sampled from a thin section cut across the whole stack or silo, and carefully mixed ; above 2 lb. weight is required for analysis.

Grain should be sampled like manures.

DAIRY PRODUCE.

Milk.—Samples of milk from individual cows should be taken direct from the milk-pail after complete milking. Average samples from a number of cows should be taken immediately after milking. Specify whether the sample is morning or evening milk, or a mixture of these. Samples to be tested for adulteration should not be drawn from the bottom or taken from the top of standing milk, but they should be ladled from the vessel after the milk has been thoroughly mixed. Samples of milk should be sent immediately to the analyst.

For most purposes a half-pint bottle of milk is a large enough sample.

Butter and Cheese.—About quarter-pound samples are required.

WATERS.

When the water is from a well, it should be pumped for some minutes before taking the sample.

If the well has been standing unused for a long time, it should be pumped for some hours, so that the water may be renewed as far as possible.

If the well has been newly dug or cleaned out, it should be pumped as dry as possible, daily, for a week before taking the sample.

Water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, some inches below the surface. *Water from the surface should not be allowed to enter the bottle.*

Spring or stream water should not be sampled in very wet weather, but when the water is in ordinary condition. Such waters should be sampled by immersing the bottle, if possible; but if not deep enough for that purpose, a perfectly clean cup should be used for transferring the water to the bottle.

When the bottle has been filled the stopper should be rinsed in the water before replacing it.

Interference with or disturbance of wells or springs, or the ground in their immediate vicinity, must be carefully avoided during sampling, and for at least twenty-four hours before it.

After a sample has been taken, it should be sent to the laboratory as speedily as possible.

A description of the source and circumstances of the water should accompany the sample, as the interpretation of the analytical results depends to some extent on a knowledge of such particulars.

N.B.—Stone jars and old wine bottles are unsuitable for conveying samples. Winchester quarts chemically cleaned should be obtained from the laboratory, Crown Mansions, 41½ Union Street, Aberdeen.

LOCAL ANALYTICAL ASSOCIATIONS.

With the view of encouraging, as well as regulating the conduct of, Local Analytical Associations, the Society, from 1881 to 1893, contributed from its funds towards their expenses a sum not exceeding £250 annually. In view of the passing of the Fertilisers and Feeding Stuffs Act, 1893, it was decided, at a meeting of the Directors on the 6th of December 1893, to discontinue that grant after the 1st of March 1894.

COMPOSITION AND CHARACTERISTICS OF MANURES AND FEEDING-STUFFS.

(*See 'Transactions,' Fifth Series, vol. xi.* 1899.)

FORMS OF GUARANTEE

Guarantee of Manure.

I guarantee that the manure called.....................and sold by me to ....contains a minimum of—

Soluble phosphoric acid = Phosphate of lime dissolved ....per cent.
Insoluble phosphoric acid = Phosphate of lime undissolved.........per cent.
Potash salts . . = Potash (K_2O) . . . .per cent.
Total nitrogen . . = Ammonia . . . .per cent.

Signature of seller.......................

Date.................19...

Guarantee of Feeding-Stuff.

I guarantee that the feeding-stuff called..............and sold by me to ....contains a minimum of—

.... per cent albuminoids.
.... per cent oil.
.... per cent carbohydrates.

Signature of seller.......................

Date.................19...

PRICES OF FERTILISERS AND FEEDING STUFFS FOR SEASON 1921.

(Cash Prices as fixed on 2nd February. These prices are subject to variation from month to month or oftener).

SUPERPHOSPHATES.

ITEM TO BE VALUED.	PRICES PER UNIT FOR THE UNDERNOTED PERCENTAGES.		
PHOSPHATES DISSOLVED . .	30 per cent.	35 per cent.	38 per cent.
February-March Price . .	£8 2 6	£9 5 0	£10 0 0
Price per Unit	5/5	5/3½	5/3¼

N. B.—These units are based on the RETAIL CASH PRICES OF MANURES at Leith and Glasgow. When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the **cash price** *per ton at which TWO TONS may be bought in fine sowable condition at Leith or Glasgow. Larger purchases may be made on more favourable terms.*

FERTILISERS.
(Other than Superphosphates.)

Name of Fertiliser.	Guarantee.	Price per Ton.			Price per Unit.		
		£	s	d.	£	s.	d.
Sulphate of Ammonia*	20·4 % Nitrogen	24	3	6	1	3	8½
" " †	20·4 % Nitrogen	24	11	0	1	4	0¾
Basic Slag (Thomas Phosphate Powder)*	18 % Total Phosphate	5	6	6	0	5	10¾
" " "	20 % " "	5	13	6	0	5	8
" " "	22 % " "	5	15	6	0	5	3
" " " ‡	38 % " "	7	2	6	0	3	9
Bone Meal §	4 Nit. 45 % Phosphate	16	0	0		..	
Steamed Bone Flour in bags . . .	1 Nit. 60 % Phosphate	14	0	0		..	
Ground Mineral Phosphate ‖ . . .	65 %	10	10	0	0	3	2¾
" " . . .	75 %	12	0	0	0	3	2½
Nitrate of Soda §	15½ % Nitrogen	23	0	0	1	9	8¼
Granular Nitrolim	15 % Nitrogen	19	10	0	1	6	0
Nitrate of Lime	13 % Nitrogen	22	10	0	1	14	7½
Potash Salts (Alsatian) § .	20 % K_2O	8	5	0	0	8	3
Potash Salts (Stassfurt) § . . .	30 % K_2O	14	5	0	0	9	6
Kainit (German) §	12 % K_2O	5	15	0	0	9	7
Kainit (Alsatian) §	14 % K_2O	6	0	0	0	8	6¾

* Carriage paid to any Railway Station in four-ton lots. † March to May price.
‡ The quantity available is uncertain. § In bags. These prices are cash prices for two-ton lots at Leith or Glasgow.
‖ Ground Mineral Phosphate, containing 57 per cent Phosphate has been offered at £7, 5s.

FEEDING STUFFS.

Name of Feeding Stuff.	Price per Ton.			Name of Feeding Stuff.	Price per Ton.		
	£	s.	d.		£	s.	d.
Linseed Cake (Home) . . .	18	0	0	Decorticated Cotton Cake . .	18	0	0
Cotton Seed Cake, White (Bombay)	10	5	0	Rice Bran	10	0	0
Cotton Seed Cake (Egyptian) .	11	5	0	Medium Offals *	14	5	0
Decorticated Ground Nut Cake .	18	0	0	Fine Offals *	15	5	0
Semi-decorticated Ground Nut Cake	15	0	0	Dried Brewers' Grains . . .	9	0	0
Undecorticated	14	0	0	Dried Distillery Grains, Best Quality	18	0	0
Palm Kernel Cake . . .	9	5	0	Feeding Treacle	14	0	0
Cocoa Nut Cake (Home) . .	14	0	0	Locust Beans	12	0	0
Extracted Soya Bean Meal . .	19	0	0	White Fish Meal	21	10	0
Decorticated Cotton Seed Meal .	18	0	0				

* Sacks included, *ex* Mill.

CLASSIFICATION OF MANURES.

Bone Meal	Genuine Bone Meal contains from 48 per cent to 55 per cent Phosphates, and from 2·75 per cent to 4 per cent Nitrogen. If phosphates are low nitrogen will be high, and conversely. If Bone Meal is so finely ground that 90 per cent or over passes a sieve of 1/16-inch mesh, an addition of 2/6 per ton should be made to the Valuation.
Steamed Bone Flour . . .	Ground to a fine powder, and containing about 60 to 65 per cent Phosphates and about 1 to 1½ per cent Nitrogen.
Basic Slag (Thomas Phosphate Powder)	Fineness of grinding is of importance. The coarsest kind used should be so finely ground that at least 80 per cent passes through a wire sieve of about 9600 holes per square inch.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the results of analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take potash salts (Alsatian): it is guaranteed (see p. 38) to contain 20 per cent oxide of potash. All potash manures are valued according to the amount of potash (oxide of potash) they yield, and potash salts (Alsatian) yields 20 per cent potash (K_2O)—*i e.*, 20 units per ton; and as a ton of potash salts (Alsatian) costs £8, 5s., the price of the unit is the twentieth part of that—viz., 8/3. If on analysis a sample of potash salts (Alsatian) guaranteed to contain 20 per cent of potash is found to contain only 19 per cent, the price per ton will be 8/3 less—viz., £7, 16s. 9d.

Similarly with all other manures, the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and therefore the proper price per ton of a manure is found by multiplying the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient, the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

Nitrate of soda contains no ammonia, but it contains nitrogen, and 14 units of nitrogen are equivalent to 17 units of ammonia.

The commercial values of manures are determined by means of the Units in the following manner:—

Take the results of analysis of the manure, and look for the following substances:—

Phosphates dissolved (or soluble phosphate) Phosphates undissolved (or insoluble phosphate) Total phosphates Nitrogen Potash	No other items but these are to be valued, except in the case of slag, where citric soluble phosphate may be valued.

Should the results of analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is slag—

The proportion of phosphate present in many slags at the present time is 22 per cent. The price per unit of phosphate is 5/3. The value of slag containing 22 per cent phosphate is therefore 22 times 5/3, equal to £5, 15s. 6d. per ton.

Suppose the manure is a superphosphate—say an ordinary superphosphate with 30 per cent soluble phosphate. It is valued thus:—

Soluble phosphate. 30 times 5/5, equal to, say, £8, 2s. 6d.

Insoluble phosphate is not valued in a superphosphate.

Note.—The units have reference solely to the MARKET PRICES of Manures, and not to their AGRICULTURAL VALUES.

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—A. N. M'ALPINE,
6 Blythswood Square, Glasgow.

The Society have fixed the following rates of charge for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

Scale of Charges.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed, 1s.
2. Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention, 1s.
3. Report on any disease affecting farm crops, 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value, 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seed he buys, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broom-rape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified. Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks, before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100: thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83·6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They should be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage paid) must be addressed to Professor M'Alpine, Botanical Laboratory, 6 Blythswood Square, Glasgow.

ENTOMOLOGICAL DEPARTMENT

Consulting Entomologist to the Society—Dr R. STEWART MACDOUGALL,
9 Dryden Place, Edinburgh.

Arrangements have been made with Mr R. Stewart MacDougall, M.A., D.Sc., Edinburgh, to advise members of the Society regarding insects or allied animals which, in any stage of their development, infest—

(*a*) Farm crops.
(*b*) Stored grain.
(*c*) Garden and greenhouse plants.
(*d*) Fruit and fruit trees.
(*e*) Forest trees and stored timber.
(*f*) Live stock (including poultry).

Members consulting Dr MacDougall will please forward with their queries examples of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or other animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, to prevent injury in transmission.

Address letters and parcels (carriage or postage paid) to Dr R. Stewart MacDougall, 9 Dryden Place, Edinburgh.

The Directors have fixed the fee payable by members to Dr MacDougall at 1s. for each case upon which he is consulted: this fee must be sent to him along with the application for information.

PREMIUMS

GENERAL REGULATIONS FOR COMPETITORS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject, whether included in the Premium List or not; and if the topic and the treatment of it are both approved, the writer may be remunerated and his paper published.

CLASS I.

REPORTS.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purpose chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Reports in competition for Nos. 2, 3, and 4 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return* and a certified measurement of the ground are requisite.

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES AND FISHERIES.

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Sovereigns. To be lodged by 1st November in any year.

SECTION 4.—MACHINERY.

FOR APPROVED REPORTS.

To be lodged by 1st November in any year.

SECTION 5.—FORESTRY DEPARTMENT.

FOR APPROVED REPORTS.

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

CLASS II.

DISTRICT COMPETITIONS.

REGULATIONS 1921.

Grants in aid of District Competitions *for* 1922 *must be applied for before* 1*st November* 1921, *on Forms to be obtained from the Secretary.*

When a Money Grant has expired, the District cannot apply again for another Money Grant for four years.

Section I.—GRANTS TO DISTRICT SOCIETIES FOR HORSES, CATTLE, SHEEP, AND PIGS.

1. Class of Stock—Limit of Grants, £340.—The Highland and Agricultural Society will make Grants to District Societies for prizes for *Breeding Animals* of any of the following Classes of Stock, viz. :—

Cattle.

Shorthorn.
Aberdeen-Angus.
Galloway.
Highland.
Ayrshire.
British-Friesian.
Jersey.
Shetland.

Horses.

Draught Horses.
Hunters.
Hackneys.
Ponies.
Shetland Ponies.

Sheep.

Blackface.
Cheviot.
Border Leicester.
Half-Bred.
Shropshire.
Oxford-Down.
Suffolk.
Wensleydale.

Pigs.

Any Pure Breed.

Cross-bred[1] animals are not eligible. The Prizes must be confined to *Breeding* Animals ; "bullocks," "geldings," "wethers," and "hog pigs" are excluded.

2. All Competitions must be at the instance of a local Society. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.

3. Grant to District, £12.—The portion of the Grant to any one District Society shall not exceed the sum of £12 in any one year.

4. Allocation of Grant.—The Grant from the Highland and Agricultural Society is not to be applied as a Grant in aid of the Premiums offered by the Local Society, but must be offered in the form of separate Prizes for the Animals chosen ; *and the Prizes must be announced in the Premium List and Catalogue of the Show as "given by the Highland and Agricultural Society."*

5. Continuance of Grant Three Years.—The Money Grant shall continue for three alternate years, provided always that the District Society shall, in the two intermediate years, continue the competition by offering Premiums for the same class of Stock as that selected in each previous year to compete for the Highland and Agricultural Society's Prizes. If no competition takes place for two years the Grant expires.

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[1] *Exceptions to this rule may, however, be authorised by the Board of Directors, on application. The Directors are prepared to consider applications from local Societies which desire to use their grants, or part thereof, as prizes for cross-bred calves and one-year-old cross-bred cattle.*

6. When it is agreed to hold the General Show of the Society in any district, no provincial show shall be held in that district in the months of June, July, or August.

7. MEDALS IN INTERMEDIATE YEARS.—In the two alternate years the Highland and Agricultural Society will place three Silver Medals at the disposal of the District Societies, for the same classes of Stock as those for which the Money Premiums are offered, provided that not less than three lots are exhibited in the same class.

8. RULES OF COMPETITION.—The Rules of Competition for the Premiums, the Funds for which are derived from Grants of the Highland and Agricultural Society, shall be such as are generally enforced by the Society receiving the Grant for Premiums offered by itself.

9. AREA AND PARISHES—FIVE PARISHES.—When making application for Grants from the Highland and Agricultural Society, the District Society must delineate the area and the number of parishes comprised in the district, and, *except in special cases*, no District Society shall be entitled to a Grant whose show is not open to at least *five* Parishes.

10. REPORTS.—Blank Forms for Reports will be furnished to the Secretaries of the different District Societies. Both in the years when the Grant is offered and in the two intermediate years, detailed reports of the competition must be given on these Forms and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than 1st November. These reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All Reports must be signed and certified as marked in the Form.

11. GRANTS—WHEN PAID.—The Grants made to District Societies will be paid in December after the Reports of the awards of the prizes have been received and found to be in order and passed by the Board of Directors, the Money Grants being paid to the Secretaries of the Local Societies and the Medals sent direct to the winners. *The Secretary of the District Society must not on any condition whatever pay any premium offered by the Highland and Agricultural Society until he has been informed that the awards are in order and has received the Grant from the Highland and Agricultural Society.*

12. RENEWAL OF APPLICATION.—No application for renewal of a Money Grant to a District Society will be entertained until the expiration of *four years* from the termination of the last Grant.

13. DISPOSAL OF APPLICATIONS.—In disposing of applications for District Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those District Societies which have been longest off the list.

DISTRICTS.

Final Year.

1. FORMARTINE AGRICULTURAL ASSOCIATION.—*Convener*, George Walker, Tillygreig, Udny Station; *Secretary*, James Skinner, Hawklaw, Ellon. Granted 1913. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)
2. KILLEARN AGRICULTURAL SOCIETY.—*Convener*, Sir David Wilson, Bart., D.Sc., of Killearn, Carbeth; *Secretary*, Maurice Malcolm, Boromeadow, Stirling. Granted 1914. (In abeyance 1916, 1917, and 1918—no Show held.)

3. Arran Farmers' Society.—*Convener*, James J. Morton, Machrie, Arran; *Secretary*, James Bone, jun., Glenkiln, Lamlash. Granted 1915. (In abeyance 1917 and 1918—no Show held.)
4. Carrick Farmers' Society.—*Convener*, T. Smith, The Castle, Maybole; *Secretaries*, J. & J. M. Gibson, Royal Bank, Maybole. Granted 1915. (In abeyance 1917 and 1918—no Show held.)

2nd Year.

5. Argyll Cattle Show Society.—*Convener*, Captain John Campbell of Kilberry; *Secretary*, James M'Dougall, South Cliff, Tarbert, Lochfyne. Granted 1910. (In abeyance in 1910—unable to hold a show. In abeyance in 1913 on account of the Paisley Show.) (In abeyance 1914, 1915, 1916, 1917, 1918, 1919, and 1920—no Show held.)
6. Castle-Douglas Agricultural Society.—*Convener*, Charles A. Phillips of Dildawn, Castle-Douglas; *Secretary*, Patrick Gifford, 118 King Street, Castle-Douglas. Granted 1912. (In abeyance 1912, 1915, 1916, 1917, 1918, 1919, and 1920—no Show held.)
7. Yarrow and Ettrick Pastoral.—*Convener*, Walter Barrie, Sundhope, Selkirk; *Secretary*, William Hunter, West Port, Selkirk. Granted 1913. (In abeyance in 1914 on account of the Hawick Show.) (1915, 1916, 1917, 1918, and 1919—no Show held.)
8. Inverness-shire Farmers' Society.—*Convener*, P. B. Macintyre, Findon, Conon Bridge; *Secretary*, David Macdonald, 15 High Street, Inverness. Granted 1916. (In abeyance 1917, 1918, and 1919—no Show held.)

1st Year.

9. Aird and Strathglass Agricultural, Horticultural, and Industrial Society.—*Convener*, R. A. Smith, Wester Lovat, Beauly; *Secretary*, Robert Ormond Smith, West Lovat, Beauly. Granted 1921.
10. Fettercairn Farmers' Club.—*Convener*, James Alexander; *Secretary*, George T. Brown, East Cairnbeg, Fordoun. Granted 1921.
11. Mar Agricultural Association.—*Convener*, R. Littlejohn Barr, The Manse, Kinellar; *Secretary*, Neil Smith, Kinellar, Aberdeenshire.
12. Strathaven and District Agricultural Exposition Society.—*Convener*, James Macfarlane, West House, Strathaven; *Secretary*, John Watson, Newton, Strathaven.

(In Intermediate Year—3 Silver Medals.)

13. Moffat and Upper Annandale Agricultural and Horticultural Society.—*Convener*, Basil H. Hill, Archbank, Moffat; *Secretary*, . Granted 1911. (In abeyance 1914, 1915, 1916, 1917, 1918, 1919 and 1920—no Show held.)
14. Liddesdale Agricultural Society.—*Convener*, David Ballantyne, Shaws, Newcastleton; *Secretary*, Robert Brown, British Linen Bank, Newcastleton. Granted 1913. (In abeyance in 1914 on account of the Hawick Show.) (1915, 1916, 1917, 1918, 1919, and 1920—no Show held.)
15. Easter Ross Farmers' Club.—*Convener*, Major Ian W. Forsyth, Balintrait; *Secretary*, George D. Gill, Commercial Bank Buildings, Tain. Granted 1914. (In abeyance 1914, 1915, 1916, 1917, 1918, and 1919—no Show held.)

16. Mount Blair Agricultural Society. — *Convener*, James M'L. Marshall, Bleaton Hallet, Blairgowrie ; *Secretary*, A. Dewar, Kirkmichael, Blairgowrie. Granted 1915. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)
17. Buchlyvie and Gartmore Agricultural Society.—*Convener*, James Stewart, Cashley, Bucklyvie ; *Secretary*, James Monach, Craignorton, Buchlyvie. Granted 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)
18. Islay, Jura, and Colonsay Agricultural Association.—*Convener and Secretary*, Robert Cullen, Bridgend, Islay. Granted 1912. (In abeyance in 1913 on account of the Paisley Show.) (In abeyance 1914, 1915, 1916, 1917, and 1918—no Show held.)
19. Ardoch Agricultural Society.—*Convener*, Henry G. Macfarlane, Netherton, Blackford ; *Secretary*, John Maxton, Rhynd, Braco, Perthshire. Granted 1914. (In abeyance 1915, 1916, 1917, and 1918—no Show held.)
20. Lanarkshire Farmers' Society.—*Convener*, Robert Hamilton, Low Motherwell Farm, Motherwell ; *Secretary*, Archibald Clark, Union Bank of Scotland, Ltd., Hamilton. Granted 1915. (In abeyance 1916, 1917, and 1918—no Show held.)
21. Morayshire Farmer Club.—*Convener*, Gordon R. Shiach, Rosebrae, Elgin ; *Secretary*, W. Rose Black, Solicitor, Elgin. Granted 1915. (In abeyance 1916, 1917, and 1918—no Show held.)
22. United Banffshire Agricultural Society.—*Convener*, Alexander Murray, Old Manse, Boyndie, Banff ; *Secretary*, F. A. Watt, Solicitor, Banff. Granted 1915. (In abeyance 1916, 1917, 1918, and 1919—no Show held.) (In abeyance 1920 on account of the Aberdeen Show.)
23. Upper Ward of Lanarkshire Agricultural Society.—*Convener*, George Findlater, Jerviewood Mains, Lanark ; *Secretary*, William Shaw, Royal Bank House, Lanark. Granted 1916. (In abeyance 1917 and 1918—no Show held.)
24. Dalkeith Agricultural Society.—*Convener*, John P. Ruson, D'Arcy, Dalkeith ; *Secretary*, James W. Speedy, Braeside, Liberton. Granted 1916. (In abeyance in 1916—no Show held.) (In abeyance in 1917, 1918, and 1919 on account of the Edinburgh Show.)
25. Dumbartonshire Agricultural Society.—*Convener*, Alex. T. Allan, Aitkenbar, Dumbarton ; *Secretary*, George Lawrence, Union Bank of Scotland, Ltd., Dumbarton. Granted 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)
26. Carnwath Agricultural Society.—*Convener*, George Muir, East Crofthill, Carnwath ; *Secretary*, Andrew T. Morrison, Commercial Bank House, Carnwath. Granted 1920.
27. Dumfries Agricultural Society.—*Convener*, Lieut.-Col. F. J. Carruthers of Dormont, Lockerbie ; *Secretary*, David Fergusson, 75 Buccleuch Street, Dumfries. Granted 1920.
28. Girvan District Agricultural Society.—*Convener*, W. K. Bone, Shalloch Park, Girvan ; *Secretary*, Jean W. Kennedy, Town Clerk's Chambers, Girvan. Granted 1920.
29. Lockerbie Agricultural Society.—*Convener*, D. J. Bell Irving, Whitehill, Lockerbie ; *Secretary*, Thomas Henderson, Solicitor, Lockerbie. Granted 1920.
30. Nether Lorn Farmers' Society.—*Convener*, John Gillies, Barnacarry, Kilninver, Oban ; *Secretary*, Neil MacDougall, Balvicar, Oban. Granted 1920.
31. Sutherland Farmers' Club.—*Convener*, Alick Grant, Erelise Farm, Dornoch ; *Secretary*, Charles B. Catto, Drummuie, Golspie. Granted 1920.

(In Abeyance 1921.)

32. Dunblane Agricultural Society—*Convener*, A. H. Anderson, Kippencavie Estate Office, Dunblane; *Secretary*, John Steward, Solicitor, Dunblane. Granted 1921.

In 1921.

Nos. 1, 2, 3, and 4 are in competition for the final year.

Nos. 5, 6, 7, and 8 are in competition for the second year.

Nos. 9, 10, 11, and 12 are in competition for the first year.

Nos. 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, and 31 are in intermediate year and compete for local Premiums. (See Rules 5 and 7.)

No. 32 is in abeyance on account of the Stirling Show.

Section 2.—GRANTS TO HORSE ASSOCIATIONS, &c., FOR STALLIONS FOR AGRICULTURAL PURPOSES.

1. The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £210 in any one year.

2. The portion of the Grant to any one Association or Society shall not exceed the sum of £15 in any one year.

3. The Grant will be available only for Stallions which, for the year to which the Grant applies, are Registered in the Register of Certified Draught Stallions published by the Board of Agriculture. (For information regarding the Registration of Stallions, apply to the Secretary of the Board of Agriculture, 4 Whitehall Place, London, S.W.)

4. The Grant will continue for three years provided the Association receiving the Grant shall hire a Registered Stallion in the two intermediate years.

5. In the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

6. Rules 2 (Committee and Convener), 10 (Reports), 11 (Time of Payment), 12 (Renewal of Grant), and 13 (Disposal of Applications) applicable to Section 1, shall be applicable to this Section.

DISTRICTS.

Final Year.

1. South Deeside Stock Improvement Society.—*Convener*, Robert Milne, Wester Durris, Drumoak; *Secretary*, John Duncan, Craiglug Cottage, Durris, Drumoak. Granted 1917.
2. Central Banffshire Farmers' Club.—*Convener*, George Cameron, Bogbain, Keith; *Secretaries*, Weir & Smith, North of Scotland Bank, Moss Street, Keith. Granted 1917.
3. Glenkens and District Horse-Breeding Society.—*Convener*, Hugh Muirhead, Barwhillantry, Parton; *Secretary*, John Scott, Drumhumphry, Corsock, Dalbeattie. Granted 1917.
4. Kilfinan and Cowal Entire Horse Society.—*Convener*, John M'Kinnon, Kildavaig, Ardlamont, by Millhouse; *Secretary*, Neil Nicolson, Auchgayle Farm, Millhouse, Kyles of Bute. Granted 1917.
5. Kirriemuir District Agricultural Society.—*Convener*, William Rough, Longbank, Kirriemuir; *Secretary*, George F. Paterson, Wellburn, Northmuir, Kirriemuir. Granted 1917.

6. LAUDERDALE AND WEST OF BERWICKSHIRE AGRICULTURAL SOCIETY.—*Convener*, George M'Kerrow, Addinston, Oxton; *Secretary*, George L. Broomfield, Lauder. Granted 1917.
7. MORAYSHIRE CLYDESDALE HORSE-BREEDING SOCIETY.—*Convener*, William Anderson, Wester Manbean, Elgin; *Secretary*, H. M. S. MacKay, 149 High Street, Elgin. Granted 1917.
8. ORKNEY WEST MAINLAND HORSE-BREEDING SOCIETY.—*Convener*, William Corrigall, North Bigging, Harray; *Secretary*, John G. S. Flett, Nistaben, Harray, Orkney. Granted 1917.

2nd Year.

9. MID-ARGYLL AGRICULTURAL SOCIETY.—*Convener*, Colonel G. W. Malcolm of Poltalloch, Kilmartin; *Secretary*, James Lindsay, Solicitor, Ardrishaig. Granted 1919.

1st Year.

10. DUMBARTONSHIRE HORSE-BREEDING SOCIETY.—*Convener*, James Snodgrass, Millig Farm, Helensburgh; *Secretary*, William Davie, 283 Main Street, Alexandria. Granted 1921.
11. GATEHOUSE DISTRICT HORSE-BREEDING SOCIETY.—*Convener*, Fred J. Turner, Caly Estate Office, Gatehouse of Fleet; *Secretary*, D. Y. Veitch, Portville, Gatehouse of Fleet. Granted 1921.
12. STIRLING DISTRICT CLYDESDALE HORSE SOCIETY.—*Convener*, James Rodger, Keir Mains, Dunblane; *Secretary*, Alexander Paterson, Solicitor, Stirling Granted 1921.

Intermediate Year—Grant in Abeyance.

13 LORN CLYDESDALE HORSE SOCIETY.—*Convener*, John Brown, Kilmore, Oban; *Secretary*, Hugh M'Innes, Lower Gylen, Kerrara, Oban. Granted 1918
14. NAIRNSHIRE FARMING SOCIETY.—*Convener*, Alexander Campbell, Viewhill, Gollanfield; *Secretary*, D. M Symon, Milton of Moyness, Auldearn. Granted 1918.
15. SCOTTISH CENTRAL HORSE-BREEDING SOCIETY.—*Convener*, J. W Prentice, Craigrie, Clackmannan; *Secretary*, William Carrick, The Baad, Stirling Granted 1918.
16. LAMMERMOOR PASTORAL SOCIETY.—*Convener*, Walter Elliot, Harehead, Duns; *Secretary*, Thomas Stephenson, Chapel, Duns Granted 1918.
17. UPPER WARD OF LANARKSHIRE AGRICULTURAL SOCIETY.—*Convener*, George Findlater, Jerviswood, Lanark; *Secretary*, William Shaw, Royal Bank of Scotland, Lanark Granted 1918.
18. DUNBLANE, DOUNE, AND CALLANDER HORSE BREEDING SOCIETY.—*Convener*, A H. Anderson, Kippendavie, Dunblane; *Secretary*, William D. MacLaren, Drummore, Doune, Perthshire. Granted 1919. (In abeyance 1920—no horse engaged)
19. CAMPBELTOWN AND SOUTHEND HORSE-BREEDING SOCIETY.—*Convener*, James M'Ceachy, Clochkiel, Campbeltown; *Secretary*, John Barbour, Aucharna, Campbeltown. Granted 1920.
20. NAIRNSHIRE FARMING SOCIETY.—*Convener*, Alexander Campbell, Viewhill, Gollanfield; *Secretary*, D. M. Symon, Easter Golford, Nairn. Granted 1920.

In 1921.

Nos. 1, 2, 3, 4, 5, 6, 7, and 8 are in competition for the final year.

No. 9 is in competition for the second year.

Nos. 10, 11, and 12 are in competition for the first year.

Nos. 13, 14, 15, 16, 17, 18, 19, and 20 are in abeyance, and compete for local premiums. (See Rule 4.)

SPECIAL GRANTS.

ANNUAL.

£40 to the Highland Home Industries Association.—*Secretary*, Alex. Mackenzie, Dochfour Estates Office, 62 Academy Street, Inverness. Granted 1895. (Did not hold a competition in 1899, 1900, 1908, 1914, 1915, 1916, 1917, 1918, 1919, and 1920.)

£20 to the Ayrshire Agricultural Association, to be competed for at the Dairy Produce Show at Kilmarnock.—*Convener*, James Middleton, Estate Office, Braehead, Kilmarnock; *Secretary*, John Howie, 58 Alloway Street, Ayr. Granted 1872. (No competition 1914, 1915, 1916, 1917, 1918, and 1919.)

The British Dairymaids' Association.—*Convener*, Mrs J. H. R. Turnbull, 7 W. Maitland Street, Edinburgh; *Secretary*, Miss Mary B. Baillie, Rosebank, Currie. 1 Minor Gold Medal and 1 Medium Silver Medal for Champion Butter-making Competitions. Granted 1908. (In abeyance 1914, 1915, 1916, 1917, and 1918—no competition.)

The Fife Agricultural Society.—*Convener*, Lord Cochrane of Cults, Crawford Priory, Springfield, Fife; *Secretary*, F. W. Christie, Eden View, Cupar. 1 Minor Gold Medal and 1 Medium Silver Medal for Butter-making Competition, open to the United Kingdom. Granted 1921.

IN ALTERNATE YEARS.—GRANT IN 1921.

£3 to Orkney.—*Convener*, James Johnston, Orphir House, Orphir, Orkney; *Secretary*, D. B. Peace, jun., Auctioneer, Kirkwall. Granted 1883. (No Show in 1915, 1916, 1917, and 1918.) (Grant in 1921.)

£3 to Sanday, Orkney.—*Convener*, W. Cowper Ward, Scar House, Sanday, Orkney; *Secretary*, James Irvine, Stove Farm, Sanday, Orkney. Granted 1902. (In abeyance 1915, 1916, 1917, and 1918—no Show held.) (Grant in 1921.)

£3 to East Mainland, Orkney.—*Convener*, John Clouston, Graemeshall, Holm, by Kirkwall; *Secretary*, Alexander Calder, Seabay, Tankerness, Kirkwall. Granted 1898. (In abeyance 1917 and 1918 –no Show held.) (Grant in 1921.)

£3 to West Mainland, Orkney.—*Convener*, James M. H. Robertson, Lyking, Sandwick, Orkney; *Secretary*, George Learmonth, Pow, Quoyloo, by Stromness, Orkney. Granted 1900. (No Show 1916, 1917, or 1918.) (Grant in 1921.)

GRANTS IN ABEYANCE, 1921.

£5 to Shetland Agricultural Society.—*Convener*, J. M. Goudie, Lerwick; *Secretary*, James J. Brown, Lerwick. Granted 1893. (In abeyance —no Show in 1914, 1915, 1916, 1917, 1918, or 1919.)

£3 to North Uist Agricultural Society.—*Convener*, Dr M. T. Mackenzie, J.P., Scolpaig, North Uist; *Secretary*, H. H. Mackenzie, J.P., Balelone, Lochmaddy. Granted in 1915 for 3 alternate years. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)

£3 to Rousay, Orkney.—*Convener*, John Logie, Trumbland, Rousay, Orkney; *Secretary*, John Harrold, Springfield, Rousay. Granted 1903. (No Show 1915, 1916, 1917, or 1918.)

£3 to South Ronaldshay and Burray, Orkney.—*Convener*, John Tomison, Halcro, St Margaret's Hope, Orkney; *Secretary*, George Esson, St Margaret's Hope, Orkney. Granted 1904. (In abeyance 1917 and 1918—no Show held.)

A sum not exceeding £100 in each year will be given in special grants to Federations of Scottish Women's Rural Institutes. The amount of any one grant shall not exceed £10. Any Institute which has received a grant for two consecutive years shall not be eligible to again apply until after the expiry of two years.

£10 to Federation of Fife Women's Rural Institutes.—*Hon. Sec.*, Miss L. J. Rintoul, Lahill, Largo.

£10 to North-Western and Western Areas, Scottish Women's Rural Institutes.—*Hon. Sec.*, Miss I. O. Shaw, Fort-William.

£10 to Berwickshire Women's Agricultural Committee—*Hon. Sec. and Treas.*, Miss Aveline Aitken.

£10 to Forfarshire Federation of Scottish Women's Rural Institutes.—*Hon. Sec.*, Miss E. S. Kay, Estates Office, Glamis.

£10 to Lanarkshire Federation of Scottish Women's Rural Institutes.—*Hon. Sec.*, Mrs Douglas, Auchlochan, Lesmahagow.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society, being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually to Societies, not on the list of Cattle, Horse, or Sheep Premiums, in addition to the Money Premiums awarded in the Districts, for—

1. **Best Bull, Cow, or Heifer of any pure breed included in Section 1.**
2. **Best Stallion, or Mare of any pure breed included in Section 1.**
3. **Best Tup, or Pen of Ewes of any pure breed included in Section 1.**
4. **Best Boar, Sow, or Breeding-Pig of any pure breed.**
5. **Best Pens of Poultry.**
6. **Best Sample of any variety of Wool.**
7. **Best Sample of any variety of Seeds.**
8. **Best managed Farm.**
9. **Best managed Green Crop.**
10. **Best managed Hay Crop.**
11. **Best managed Dairy.**
12. **Best Sweet-Milk Cheese.**
13. **Best Cured Butter.**
14. **Best Fresh Butter.**
15. **Best collection of Roots.**
16. **Best kept Fences.**
17. **Male Farm Servant who has been longest in the same service, and who has proved himself most efficient in his duties, and to have invariably treated the animals under his charge with kindness.**
18. **Female Servant in charge of Dairy and Poultry who has been longest in the same service, and who has proved herself most efficient in her duties, and to have invariably treated the animals under her charge with kindness.**

19. Best Sheep-Shearer.
20. Most expert Hedge-Cutter.
21. Most expert Labourer at Draining.
22. Best Maker of Oat-Cakes.

It is left to the local Society to choose out of the foregoing list the classes for which the Medals are to be competed.
The Medals are granted for two years, and lapse if not awarded in those years.
No Society shall receive more than two Medals in any year.

Aberdeenshire.

1. KINNETHMONT AGRICULTURAL SOCIETY.—*Convener*, G. E. N. Leith Hay, Leith Hall, Kinnethmont; *Secretary*, John Reid, Benview, Kinnethmont. 2 Medals 1921.
2. GARIOCH FARMER CLUB.—*Convener*, George Young, Greenhall, Insch; *Secretary*, J Anderson, Commercial Bank of Scotland, Ltd., Insch. 2 Medals. 1921.

Argyllshire.

3 APPIN AGRICULTURAL SHOW SOCIETY.—*Convener*, R H Corson, Auchindarroch, Duror; *Secretary*, Donald Macpherson, Schoolhouse, Appin 2 Medals 1921

Banffshire

4 MARNOCH AND CORNHILL AGRICULTURAL SOCIETY.—*Convener*, James Cowie, M R C V S, Bogton, Cornhill; *Secretary*, David Findlay, Bank Agent, Aberchirder 2 Medals. 1914. (In abeyance 1914, 1915, 1916, 1917, 1918, and 1919—no Show held)
5 ABERDOUR AND NORTH-EAST AGRICULTURAL SOCIETY.—*Convener*, Alexander Beddie, Bridgend, Fraserburgh, *Secretary*, Robert Pittendrigh, jun, Newseat, Fraserburgh 2 Medals. 1915. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)
6 SPEY, AVEN AND FIDDOCHSIDE FARMING SOCIETY.—*Convener*, John Philip, Dandaleith, Craigellachie; *Secretary*, R Dick Stuart, Seafield Square, Rothes 2 Medals 1921

Dumbartonshire

7 CUMBERNAULD AGRICULTURAL SOCIETY.—*Convener*, John Torrance, Hetlerwood, Castlecary, by Bonnybridge, *Secretaries*, R. B. Henderson and John Longwell, Parkviews, Cumbernauld. 2 Medals 1921

Dumfriesshire.

8 SANQUHAR FARMERS' SOCIETY.—*Convener*, James Moffat, Gateside, Sanquhar; *Secretary*, W. M. Henderson, Solicitor, Sanquhar. 2 Medals. 1914 (In abeyance 1914, 1915, 1916, 1917, 1918, 1919, and 1920—no Show held)

Inverness-shire.

9 STRATHSPEY FARMER CLUB SOCIETY.—*Convener*, J. Grant Smith, Inverallan, Grantown on Spey; *Secretary*, John G. MacDougall, Dunolby, Grantown on Spey. 2 Medals. 1921.

Lanarkshire.

10. SHOTTS CALDERWATER FARMERS' SOCIETY.—*Convener*, John Weir, Shottsburn, Holytown; *Secretary*, William Good, Home Farm, Hartwood, Lanarkshire. 2 Medals. 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)

Kirkcudbrightshire.

11. ST MARY'S ISLE ESTATES AND DISTRICT AGRICULTURAL SOCIETY.—*Convener*, James Phillips, Carse, Kirkcudbright; *Secretaries*, John Gibson and Robert Montgomery, Solicitors, Kirkcudbright. 2 Medals. 1921.

Orkney.

12. SHAPANSEY AGRICULTURAL ASSOCIATION.—*Convener*, James Johnston of Coubister, Orphir House, Orphir, Orkney; *Secretary*, William Robertson, Elwickbank, Shapansey, Orkney. 2 Medals. 1915. (In abeyance 1915, 1916, 1917, 1918, and 1919—no Show held.)
13. ROUSAY AGRICULTURAL SOCIETY.—*Convener*, John Logie, Trumland House, Rousay; *Secretary*, John Harrold, Springfield, Rousay, Orkney. 2 Medals. 1920
14. WALLS AND HOY AGRICULTURAL SOCIETY.—*Convener*, Robert Cutt, Melsetter Farm, Melsetter, Orkney; *Secretary*, William Sutherland, Old Customhouse, Longhope. 2 Medals. 1921.

Perthshire.

15. DUNBLANE AGRICULTURAL SOCIETY.—*Convener*, A. H. Anderson, Kippendavie, Dunblane; *Secretary*, John Stewart, Solicitor, Dunblane. 2 Medals. 1916. (In abeyance 1916, 1917, 1918, and 1919—no Show held.)

Renfrewshire.

16. MEARNS AGRICULTURAL SOCIETY.—*Convener*, John Lambie, Langton, Newton Mearns; *Secretary*, Alexander Garvie, Plenploth, Newton Mearns. 2 Medals. 1920.
17. SHETTLESTON AND CHRYSTON AGRICULTURAL SOCIETY.—*Convener*, James C. Caldwell, 95 Morrison Street, Glasgow; *Secretary*, John Watson, 24 St Vincent Place, Glasgow. 2 Medals. 1920.

Sutherlandshire.

18. SUTHERLAND CROFTERS' SHOW SOCIETY.—*Convener and Secretary*, J. B. Morrison, Rhevis, Golspie. 2 Medals. 1921.

Applications from other Districts must be lodged with the Secretary of the Society *by 1st November next.*

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.

2. The classes for which Medals are granted must be in accordance with the list at page 53. The Committee shall select the classes, and specify them in the Report.

3. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.

4. The Money Premiums given in the District must be not less than £2 for each Medal claimed.

5. The Medal for Sheep-Shearing shall always accompany the highest Money Premium.

6. There must not be fewer than three competitors in all the classes.

7. Regarding Reports, despatch of Medals, and application for renewal of Grant, Rules 10 and 11, Section I., will apply.

8. When a grant of Medals has expired, the District cannot apply again for Medals for two years.

PLOUGHING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, provided a Report in the following terms on the official form is made to the Secretary, within one month of the Competition, by a Member of the Society. Forms of Report to be had on application.

FORM OF REPORT.

I, of , Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the Association at in the county of on the when ploughs competed ; of land were assigned to each, and hours were allowed for the execution of the work. The sum of £ was awarded in the following proportions, viz. :—

[*Here enumerate the names and designations of successful Competitors.*]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match ; and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve ploughs in Competition, and not less than Three Pounds awarded in Prizes by the local Society. The Medal to be given to the winner of the first prize.

7. The Local Committee or Society may, if they desire, arrange to let each ploughman have one person to guide the horses for the first two and the last two furrows, but in no case shall ploughmen receive any other assistance, and their work must not be set up nor touched by others. Attention should be given to the firmness and sufficiency of the work below more than to its neatness above the surface.

8. The Local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than ten hours per imperial acre on light land, and fourteen hours on heavy or stony land.

HOEING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Hoeing Competitions, provided a Report in the following terms on the official form is made to the Secretary within a month of the Competition by a Member of the Society. Forms of Report to be had on application.

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Hoeing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, No. 3 George IV. Bridge, Edinburgh.

3. Not more than one match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match ; and same Competitor cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve hoes in Competition, and not less than Three Pounds awarded in prizes by the local Society. The Medal to be given to the winner of the first prize.

7. The time to be allowed to be decided by the local Committee, but in no case to exceed two hours for two drills of 100 yards each, the third drill being unoccupied, so that Competitors do not interfere with their neighbour's work.

8. Competitors must finish their work as they go along—no turning back or after-dressing allowed. Handpicking or transplanting shall be strictly prohibited.

9. A Committee shall be appointed to watch the work, and any Competitor found transplanting or otherwise not complying with the Rules shall have his number withdrawn, and be debarred from receiving any prize which might otherwise have been awarded to him.

NOTE.—Medals will be awarded under similar conditions for Competitions in hand-singling.

LONG SERVICE CERTIFICATES AND MEDALS.

Certificates and Medals for long service are awarded by the Society to farm servants, male or female, having an approved service of not less than thirty years—(*a*) with one employer on the same or different holdings; (*b*) on the same holding with different employers. These Certificates and Medals will be issued as applications are received.

Forms to be obtained from the Secretary.

CLASS III.

COTTAGES AND GARDENS.

The following Premiums are offered for Competition in the Parishes after mentioned.

The Premiums are granted for two years.

PREMIUMS FOR BEST KEPT COTTAGES AND GARDENS.

1.	Best kept Cottage	£1 0 0
	Second best	0 10 0
2.	Best kept Cottage Garden	1 0 0
	Second best	0 10 0

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardeners' Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.

3. It is left to the Committee of the District to regulate the maximum annual rent of the Cottages, which may, with the garden, be from £5 to £7.

4. To warrant the award of full Premiums, there must not be fewer than three competitors in each class. If there are less than three competitors in each class, only half Premium will be awarded.

5. A person who has gained the highest Premium cannot compete again.

6. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly; the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

7. In estimating the claims for the Garden Premiums, the judges should have in view—the sufficiency and neatness of the fences and walks; the cleanness of the ground; the quality and choice of the crops; and the general productiveness of the garden.

8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be lodged with the Secretary of the Highland and Agricultural Society *on or before the* 1*st November next.*

9. When a grant of Money has expired, the District cannot apply again for aid for four years.

Parishes desirous of these Premiums must lodge applications with the Secretary *on or before the* 1*st November next.*

(*No Money Grants offered in* 1921.)

MEDALS FOR COTTAGES AND GARDENS, OR GARDEN PRODUCE, POULTRY, AND BEE-KEEPING.

1. The Society will give annually one or two Minor Silver Medals to a limited number of local Associations or individuals, who establish Competitions and Premiums for Cottages, Gardens, Garden Produce, or Bee-Keeping. The Medals will be granted for two years.

2. The Medals may be offered in any two of the following sections, *but under no circumstances will the two Medals be given in one of the sections:—*

(1) Best kept Cottage or best kept Cottage and Garden. (One Medal only.)

(2) Best kept Garden. (One Medal only.)

(3) Best Collection of Garden Produce—Flowers excluded. (One Medal only.)

(4) Best Pen of Poultry.

(5) Honey. (One Medal only.)

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £15. The occupiers of Lodges at Gentlemen's Approach Gates, and Gardeners in the employment of others, are not entitled to compete.

4. If Competition takes place for Garden Produce, such produce must be *bona fide* grown in the Exhibitor's Garden. He will not be allowed to make up a collection from any other Garden. The produce must consist of Vegetables, or Vegetables and Fruit (not Fruit alone). Flowers are excluded.

5. The Honey must be the produce of the Exhibitor's own Hives.

6. To warrant the award of a Medal, there must not be fewer than three Competitors.

7. Blank forms for Reports of Competitions will be furnished to the Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than *1st November*, for the approval of the Directors, against whose decisions there shall be no appeal.

8. When a grant of Medals has expired, the District cannot apply again for aid for two years, and if no competition takes place in a District for two years the grant expires.

9. Applications for these Medals must be made *before* 1*st November next.*

Fifeshire.

1. NEWBURGH GARDENING SOCIETY.—*Convener*, Andrew Kay, Hillside Cottage, Newburgh; *Secretary*, David M. Adamson, High Street, Newburgh. 2 Medals. 1916. (In abeyance 1916, 1917, 1918, and 1920—no Show held.)

2. DYSART PARISH HORTICULTURAL SOCIETY.—*Convener*, Henry Beveridge, 86 Salisbury Street, Kirkcaldy; *Secretary*, Alex. Penman, 162 St Clair Street, Kirkcaldy. 2 Medals. 1920.

Perthshire.

3. BRACO HORTICULTURAL SOCIETY.—*Convener*, John W. Stirling, J.P., Braco; *Secretary*, William M'Ildowie, Crofthead, Braco. 2 Medals. 1915. (In abeyance 1915, 1916, 1917, 1918, and 1920—no Show held.)

Renfrewshire.

4. KILBARCHAN HORTICULTURAL AND ALLOTMENT-HOLDERS' ASSOCIATION. —*Convener*, John Neil, Easwald Bank, Kilbarchan; *Secretary*, J. H. Wardlaw, 5 Church Street, Kilbarchan. 2 Medals. 1920.
5. "SIR JOHN STIRLING MAXWELL" GARDENS HORTICULTURAL SOCIETY. —*Convener*, J. W. Ralston, 3 Mannering Road, Shawlands; *Secretary*, John R. Bain, 7 Holmhead Crescent, Cathcart. 2 Medals. 1920.

FIRST EDITION.]

NOTE.—From 20th till 28th July all communications should be addressed to "The Secretary, Secretary's Office, Showyard, Stirling."

Address for Telegrams—"SOCIETY," EDINBURGH.
Telephone No.—CENTRAL 3655.

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

GENERAL SHOW OF STOCK AND IMPLEMENTS

STIRLING

26TH, 27TH, 28TH, AND 29TH JULY 1921.

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 23rd May.
CATTLE, HORSES, SHEEP, AND PIGS—Thursday, 9th June.
GOATS, POULTRY, DAIRY PRODUCE, BEE APPLIANCES, HONEY, AND WOOL (separate Forms)—Thursday, 9th June.

No Entry at ordinary fees taken later than those which are received at the Society's Office, Edinburgh, by first post, or 10 o'clock, on Friday morning (10th June). Late Entries for Cattle, Horses, Sheep, Goats, and Pigs taken on payment of 10s. additional for each entry (Poultry, Dairy Produce, Bee Appliances, Honey, and Wool at double fees) till Wednesday morning (15th June) at the Society's Office, Edinburgh, at 10 o'clock.

President of the Society.

HIS GRACE THE DUKE OF MONTROSE, K.T.

Chairman of the Board of Directors.

DAVID FERRIE, ESQ., OF PARBROATH, CUPAR-FIFE.

Convener of the Local Committee.

GENERAL ARCHIBALD STIRLING OF KEIR.

The District connected with the Show comprises the Counties of Clackmannan, Dumbarton, Perth (Stirling Show District), and Stirling.

Highland & Agricultural Society of Scotland

PRIVILEGES OF MEMBERS

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.*[1]
6. *To have Manures and Feeding-Stuffs analysed at reduced fees.*
7. *To have Seeds tested at reduced fees.*
8. *To have Insect Pests and Diseases affecting Farm Crops inquired into.*
9. *To attend and vote at General Meetings of the Society.*
10. *To vote for the Election of Directors, &c., &c.*

ANALYSIS OF MANURES AND FEEDING-STUFFS

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow:—

The estimation of *one* ingredient in a manure or feeding-stuff	5s.
The estimation of *two or more* ingredients in a manure or feeding-stuff . . .	10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

Higher Subscription.—The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

Lower Subscription.—Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with Agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 3s.[2] Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 3s. 6d. or 10s. list).

JOHN STIRTON, *Secretary.*

3 GEORGE IV. BRIDGE, EDINBURGH.

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[1] Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

[2] Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

REGULATIONS.

GENERAL CONDITIONS.

1. The Competition, except where otherwise stated in the Premium List, is open to Exhibitors from all parts of the United Kingdom.

2. Every Lot must be intimated by a Certificate of Entry, lodged with the Secretary *not later than Monday, 23rd May, for Implements and other Articles, and Thursday, 9th June, for Stock, Poultry, and Dairy Produce, &c.* No Entry taken at ordinary fees later than those which are received at the Society's Office by first post, or 10 o'clock, on Friday morning, 10th June. Late Entries for Cattle, Horses, Sheep, Goats, and Pigs taken on payment of 10s. additional for each entry (Poultry, Dairy Produce, Bee Appliances, Honey, and Wool at double fees) till Wednesday morning (15th June), at the Society's Office, Edinburgh, at 10 o'clock. Printed forms of Entry will be issued on application to the Secretary, No. 3 George IV. Bridge, Edinburgh. Admission Orders for Exhibits and Attendants will be forwarded to Exhibitors, by post, previous to the Show. *Entries.*

3. This Premium List is published and the Show will be held subject to any Orders that may be issued by the Board of Agriculture or Local Authorities. Any licences that may be required for the movement of Stock into or away from the Show must be obtained by Exhibitors. For these licences, application should be made to the Chief Constable, Stirling. *Licences for moving Stock.*

4. Animals suffering from any form of infectious or contagious disease—including ringworm or other form of infectious or contagious skin ailment—must not be brought to the Show. Those infringing this Rule shall be liable to a fine of 40s., and to have their Stock removed. *Diseased Animals.*

5. No Entry can be received or recorded unless it is accompanied by the necessary fees, and complies fully with the Regulations in the Premium List, the Secretary being empowered to return entries sent without the necessary fees. *Fees to accompany Entries.*

6. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor. The Society shall have power at any time to call upon an Exhibitor to furnish proof of the correctness of any statement in his entry. *Particulars of Entries.*

7. The name of the Breeder, if known, must be given, and if the Breeder is not known, a declaration to that effect, signed by the Exhibitor, must be made on the Entry Schedule, and no pedigree will be entered in the Catalogue when the Breeder is unknown. *Name of Breeder.*

8. All animals, except calves, foals, and lambs shown with their dams must be entered in the classes applicable to them, and cannot be withdrawn after entry, or other animals be substituted in their place. *No substitution of Animals.*

9. For prizes given by the Society, no animal shall be allowed to compete in more than one class, or to compete in any class except that prescribed for animals of its pedigree and description; but this Rule does not apply to the Jumping and Harness Classes. *One Class only.*

10. All stock exhibited at the Show, except where otherwise stated in the Premium List, must be, at the time of entry, the *bona fide* property of the Exhibitor in whose name it is entered. *Ownership.*

11. Exhibitors are alone responsible for the accuracy and eligibility of their entries. The recording of an entry or the admission of the exhibit to the Showyard will not relieve the Exhibitor of this responsibility. The entry-fee paid for an animal entered in a class for which it is not eligible is not returnable. *Responsibility for Entries.*

Society not liable.

12. The Society shall not be liable for any loss or damage which Stock, Poultry, Dairy Produce, &c., Implements, or other articles may sustain at the Show, or in transit.

Disqualified Exhibitors.

13. The Society reserve to themselves the right of refusing, cancelling, or prohibiting the exhibition of entries from any person who, after 1st January 1904, has been expelled from the membership of any Agricultural or Dairy Society, or who may have been prohibited, suspended, or disqualified from making entries or exhibiting at the Show or Shows of any Agricultural or Dairy Society or Breed Society in consequence of having attempted to obtain a Prize by giving a false Certificate, or by other unfair means, or who is under exclusion from any Breed Society for fraudulent practices.

Animal Disqualified.

14. When an animal has previously been disqualified by the decision of any Agricultural or Breed Society in the United Kingdom, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to state it, and the grounds thereof, in his entry, to enable the Directors to judge of its validity.

Tampering with Animals.

15. Any artificial contrivance or device of any description found on or proved to have been used on an animal, either for preventing the flow of milk or for any other improper purpose, will disqualify that animal from being awarded a Premium, and the Owner of said animal may be prohibited from again entering Stock for any of the Society's General Shows, for such a period as the Directors may see fit.

Blindfolding Horses.

16. Horses shall not be blindfolded while being shown in the Ring.

Rejecting Entries.

17. The Society further reserve to themselves the right of refusing any entries they may think fit to exclude, or to cancel any entry made, or to prohibit the exhibition of any entry.

Control of Exhibits.

18. Stock entered for competition, and actually in the Show, is subject to the control and under the orders of the Stewards, Secretary, and other Show officials of the Society, and such stock may not be withdrawn from competition without the consent of the Stewards or Secretary.

Improper Conduct.

19. Persons making insulting remarks to, or in any way unduly interfering with, the Judges, Stewards, or other officials while in the performance of their duties, and all Exhibitors or others in charge of stock while in the judging rings refusing to accept or display tickets, rosettes, &c., awarded by the Judges, and handed to them by the Stewards or other officials, or tearing up tickets, rosettes, &c., so awarded and handed to them, or indulging in any similar conduct, shall be considered guilty of misconduct, and shall be dealt with under these rules.

Subject to Orders.

20. All persons in charge of stock or other exhibits, and all persons admitted into the Showyard, shall be subject to the rules of the Society, and shall obey the orders of the Stewards, Secretary, and other officials of the Society. Exhibitors shall be answerable for the conduct of their servants or representatives.

Power of Officials.

21. The Stewards and other officials have power to enforce the regulations of the Society in their different departments.

Protests.

22. A protest having reference to exhibits at the Show may be lodged by any person having interest. Protests having reference to competitions which take place on the first day of the Show must be lodged in writing with the Secretary at his Office in the Showyard not later than 9 A.M. on Wednesday, the second day of the Show, and parties must be in attendance at the Secretary's Office in the Showyard at 9.30 A.M. that day, when protests may be disposed of. Protests relating to competitions taking place after the first day of the Show must be lodged before 5 P.M. on the day on which the particular exhibition takes place. Each protest must state specifically the grounds of objection, and must be accompanied by a deposit of £2, 2s., which deposit may, if the objection be proved frivolous to the satisfaction of the Directors, be forfeited. Protests may be lodged at any time by Directors,

and in this case no deposit will be required. Protests will be heard and determined by the Directors. Protests on veterinary grounds not received.

Penalties for Offences.

23. The violation of any one of the regulations, or disobedience of the orders of the Directors, Stewards, Secretary, or other officials of the Society, shall render the offending person liable to the forfeiture of all premiums awarded to him, or of such a portion as the Directors may ordain, and also liable to be expelled from the membership of the Society, and disqualified from again, or for a certain number of years, exhibiting at the Shows of the Society, or to have his case disposed of by fine or otherwise as the Directors may determine.

Final Authority.

24. The decision of the Directors shall, in every matter arising at or in connection with the Show, be final; and every person present at the Show, whether as a Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have agreed to refer the subject-matter of such decision to the final determination of the Directors to the exclusion of all Courts of Law.

Intimating Decisions.

25. All decisions under these rules may, along with the names and addresses of the persons against whom such decisions have been pronounced, be communicated by the Secretary of this Society to the Secretaries of all Agricultural or Dairy Societies holding open Shows in the United Kingdom, and to the Secretaries of all Breed Societies in the United Kingdom, and may be published in the Annual Reports of this Society, and in such newspapers or journals as the Directors may determine; and every Exhibitor competing at the Show, and every person present at the Show, whether as a Director, Member of Committee, Steward, Judge, Exhibitor, Visitor, or otherwise, shall be deemed thereby to have consented to such communication and publication.

Former Winners.

26. An animal to which a first Premium has been awarded, even if it should not qualify for that Premium, or an animal which subsequently becomes entitled to a first Premium, at a General Show of the Society, cannot again compete in the same class, notwithstanding any alteration in the heights stated for such class, but may be exhibited as Extra Stock.

Herd-books.

27. Shorthorn, Aberdeen-Angus, Galloway, Highland, and British Friesian cattle must be entered in the herd-books—Ayrshire Cattle in the herd-book or any Appendices thereto—or the Exhibitor must produce evidence that his animal is eligible to be entered therein.

Height of Horses.

28. All Horses or Ponies entered in classes in which a particular height is stated shall, before being judged, be measured with their shoes on. No subsequent measuring or alteration of shoes will be permitted.

Weight of Shoes.

29. Exhibitors of Hackney and Harness Horses shall be required to adhere to the Rules and Regulations of the Hackney Horse Society with regard to the weight of shoes on their exhibits, the Society's Veterinary Inspector being instructed to examine all the Hackneys and Harness Horses on the opening morning of the Show, and see that the following Rules as to the weight of shoes are attended to—viz., (*a*) For Hackneys exceeding 14 hands (except Hackney yearling colts and Hackney yearling fillies), no shoe (nails included) may exceed 2 lb. in weight; (*b*) for Ponies not exceeding 14 hands, Hackney yearling colts and Hackney yearling fillies, no shoe (nails included) may exceed 1½ lb. in weight.

Overfeeding.

30. Breeding Stock must not be shown in an improper state of fatness, and the Judges are requested not to award Premiums to overfed animals; and no Cattle or Sheep which after the age of twelve months have been exhibited as Fat Stock at any Show are eligible to compete in the Breeding Classes for the Society's Prizes.

Sires.

31. Aged Bulls and Stallions must have had produce, and, along with two-year-old Bulls, three-year-old Colts, and two-shear and aged Tups, have served within the twelve months immediately preceding the Show.

Calving of Cows.

32. Except as may be otherwise specially provided in this Premium List, cows of all breeds (other than Ayrshire and British Friesian) must

have had a calf within nine months previous to the Show, and when exhibited must be in milk. Cows of the Ayrshire and British Friesian breeds must have had a calf within fifteen months previous to the Show. Animals of any age that have had a calf must be shown as Cows.

In-calf Heifers.

33. Two-year-old Heifers of the Shorthorn, Aberdeen-Angus, Galloway, and British Friesian breeds, two-year-old Yeld Ayrshire Heifers, and three-year-old Highland Heifers, must be in calf when exhibited, and the Premiums will be withheld till birth be certified, which must be within nine months after the Show.

Mares.

34. A Mare entered in a class for "Mares with foal at foot" must have produced a foal after 1st January of the year of the Show, must have regularly nursed her own or another foal, and must have the foal with her in the Show. If the mare's own foal is alive it must be the foal shown with the mare. In the case of a Mare that has not foaled before the Show, or whose foal has died, she shall, if not in milk, be eligible without further entry to compete among the Yeld Mares if a corresponding class for Yeld Mares be included in the Premium List. Draught Yeld Mares must produce a foal within twelve months from the first day of the Show. A Mare in a class for "Mares or Geldings" may or may not have had a foal in the year of the Show, but shall not have her foal exhibited with her, nor be in milk at the time of the Show.

Sows.

35. All Sows farrowed prior to the year before the Show must have produced a litter of pigs in the year of the Show before the opening day. Sows farrowed in the year prior to the year of the Show must either have produced a litter of pigs before the Show, or produce a litter within three months of the last day of the Show. Certificates of the date of farrowing must be supplied in every case.

Calves and Foals.

Calving, Farrowing, and Foaling Certificates.

36. With reference to Regulation 33, birth of a live or full-time calf must be certified; and in regard to Regulation 34, birth of at least a nine months' foal; or in the case of the death of the dam, a Veterinary Surgeon's certificate must be produced certifying that at the time of death the animal was so far advanced with calf or foal that if it had lived it would have produced a calf or foal within the periods stated in Rules 33 and 34. Certificates required by the foregoing Regulations will be issued after the Show, and must reach the office of the Secretary as follows: calving certificates within ten months, farrowing certificates within four months, and foaling certificates within thirteen months, of the last day of the Show. In default of this, the animal will be regarded as having failed to fulfil the Regulations, and the prize will therefore pass to the animal next in order of merit or be forfeited.

Special Prizes.

37. Except when otherwise provided, the awards of Special Prizes shall not be subject to the Regulations as to calving and foaling.

Payment of Prizes.

38. The Premiums awarded, except those withheld till birth of calf or foal or litter of pigs is certified, will be paid as soon after the Show as practicable, and, with the exception of the Tweeddale Gold Medal, Special Cups, and Medals, may be taken either in money or in plate.

Veterinary Examination of Stallions and Colts.

39. No Stallion or entire Colt, two years old or upwards, shall be allowed to compete for any of the Society's Prizes unless it has previously been licensed for stud purposes during the current year by the Board of Agriculture for Scotland, the Ministry of Agriculture and Fisheries, or the Irish Department of Agriculture.

Soundness of other Horses.

Accommodation for examination.

40. Judges are particularly requested to satisfy themselves, as far as possible, regarding the soundness of all Horses before awarding the Prizes, and to avoid giving Prizes to animals showing symptoms of hereditary disease. The Judges may consult the Society's Veterinary Surgeon if they deem it expedient. Private accommodation is provided for the examination of horses by the Veterinary Surgeon. No protests on veterinary grounds will be received.

Ewes. 41. Every Ewe must have given birth to and reared a lamb in the year of the Show; and Ewes of the Blackface and Cheviot breeds must be in milk, and have their lambs at foot.

Milking. 42. Animals in milk of the Dairy breeds must be milked dry at 6 o'clock on the evening previous to the opening of the Show in the presence of, and to the satisfaction of, the Steward of Cattle or a representative of the Society duly authorised by him.

Clipping. 43. Sheep must have been clipt bare after the first day of the November preceding the Show, no part of the animal to be clipt prior to that date—this Rule not to apply to Cheviot Sheep.

No Blackface Sheep shall be eligible which has not been clipt bare on or after the 1st April of the year of the Show.

Colouring, &c., of Sheep. 44. The Steward of Sheep, who can call in assistance if so desired by him, shall have full power to disqualify any pen of Blackface, Cheviot, Border Leicester, and Half-bred Sheep which he considers unnaturally coloured, or when the fleece, face, or legs have been dealt with by the use of foreign substances.

Flock Books. 45. All Oxford Down and Suffolk Sheep shown must be entered or eligible for entry in the Oxford Down and Suffolk Flock Books respectively.

Poultry. 46. In Poultry the Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

Railway Passes. 47. Railway Certificates for Stock are issued to Exhibitors before the Show along with their Tickets of Admission, one Certificate for the outward and another for the return journey being sufficient for each Exhibitor for any number of exhibits (see page 15).

Admission of Stock. 48. Poultry and Stock will be admitted on Monday, the day before the opening of the Show, and, with the exception of Horses, must be in the Yard before 12 o'clock that night. Horses must be in before 8 o'clock on the morning of Tuesday, except those entered in classes for which other times for arrival are elsewhere stated in this List. Judging begins at 9.30 A.M. on Tuesday. Exhibited on Tuesday, Wednesday, Thursday, and Friday. Stock may be admitted on the Saturday preceding the Show, but only by sending two days' prior notice to the Secretary's Office in the Showyard.

Parades. 49. Horses and Cattle must be paraded at the times stated in the Programme of the Show, and when required by the Stewards, and under their direction. Females of the Highland Cattle breed will, on this occasion, be paraded at the option of the exhibitor. In Parade, Horses must be ridden or led as provided in their respective classes. Prize and commended Cattle and Horses will receive two rosettes each, which must be attached to the head of the animal, one on each side. Attendants must be beside their animals *twenty minutes before the hour of Parade*, and be ready to proceed to the ring immediately on receiving the order of the Stewards. Infringement of this Rule, or failure of any attendant to obey the orders of the Society's officials, will render the Exhibitor liable to a fine of 20s. for each separate infringement or act of disobedience, and to the forfeiture of any or all of the Prizes awarded to him at this Show.

Responsibility of Exhibitors. 50. Exhibitors shall be answerable for all acts, whether committed by themselves, their servants, or others in charge of their Stock, and shall be responsible for the condition of their animals during the whole time they remain in the Showyard.

Moving from stalls. 51. No animal shall be taken out of its stall after 10 A.M. during the Show except by order of the Stewards, or with permission of the Secretary.

Washing Cattle. 52. Cattle shall not be taken out of their stalls to be washed after the Judging has commenced. Cattle must not be washed beside the Judging Rings. Those infringing this Rule shall be liable to a fine of 10s.

Soaping prohibited. 53. Soap or other adhesive material must not be used in dressing cattle or horses. Infringement of this Rule will render the animal upon which the material is used liable to be disqualified.

Loose-boxes and Stalls. 54. Loose-boxes will be provided for all horses; covered accommodation for other live stock. Stalls for nurse cows charged at ordinary rates. Boxes (floored) for attendants on Cattle, Horses, Sheep, Goats, and Pigs will be provided at a charge of 40s. for each box for members; 50s. for non-members. (See Rule 79.)

Floored boxes and stalls for Animals. 55. Exhibitors requiring the boxes, stalls, or pens for their animals to be floored must give instructions, stating the Catalogue No., to the Society's Showyard Erector, Mr John Reid, Showyard, ten days before the Show opens. (For charges, see Rule 78.)

Securing Cattle. 56. Bulls must be secured by nose-rings, with chains or ropes attached, or with strong halters and double ropes. All Cattle, other than Highland Cattle, must be tied in their stalls.

Concealing Animals. 57. During the time the Show is open to the public no rug shall be hung up so as to conceal any animal in a horse-box or stall, except with the special permission of the Steward of that department.

Fodder. 58. Five days' supply of straw, hay, grass, and tares will be provided free by the Society. Any additional fodder or other kinds of food required will be supplied at fixed prices in the Forage-yard. The Forage-yard will close at 1.30 P.M. on Friday, the last supply to be given to attendants then; and if any extra supply is required on account of stock remaining in the Yard after the close of the Show, notice must be given to the Forage Steward not later than 5 o'clock on Thursday. Any servant removing bedding from an adjoining stall will be fined in double the amount taken. Exhibitors may fetch their own cake or corn to the Yard, but not *grass, tares, hay, or straw.* Coops, food, and attendance for Poultry will be provided by the Society.

Feeding appliances. 59. Servants in charge of Stock must bring their own buckets or pails, and a piece of rope or sheep-net to carry their forage. Mangers, and sheep and pig troughs, will be provided.

Sawdust. 60. Sawdust must not be used as bedding for Stock.

Water. 61. As the command of water in the Yard is limited, it is particularly requested that waste be avoided.

Lights and Smoking. *Closing of Gates.* 62. No lights allowed in the Yard at night, and Smoking is strictly prohibited within the Sheds. Those infringing this Rule shall be liable to a fine of 10s. The gates will be closed at midnight, and no person shall be allowed to enter or leave the Yard between that time and 5 A.M. without a special permit.

Removal of Stock. 63. Stock or Poultry cannot be removed from the Yard till 5 P.M. on Friday, the last day of the Show, except on certificate by the Veterinary Surgeon employed by the Directors, countersigned by the Steward of the department or the Secretary.

Withdrawal of horses over night. 64. At the close of the Show on Tuesday, Wednesday, and Thursday, horses may be withdrawn for the night on a deposit of £5 for each animal, which shall be forfeited, along with any prize money it may have gained, if the animal is not brought back. They must return between 7 and 7.30 the following morning, and those not in before 8 shall forfeit 10s. Horse passes to be applied for at the Secretary's Office between 5 and 6 P.M. on Tuesday, and the deposit, unless forfeited in whole or in part, will be returned between 12.30 and 2.30 on Friday.

Order in removal. 65. When the Stock is leaving the Yard, no animal is to be moved till ordered by those in charge of clearing the Yard. Those transgressing this Rule shall be liable to a fine of 10s., and to be detained till all the other Stock is removed.

Penning and removing Poultry. 66. Poultry may be penned before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor an authorised representative of the Exhibitor being present to pen or remove Poultry, the birds will be penned and removed by men hired and paid by the Society, but this will be done on the understanding that the men are hired to do the work on behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to Exhibits by errors or accidents in penning, despatching, or conveying Exhibits.

Closing of Poultry Shed to Public. 67. On the opening day of the Show the Poultry Shed will be closed to the public during the Judging. On the last day of the Show the Poultry Shed will be closed to the public at 4 P.M.; at 5 P.M. Exhibitors or their representatives will be admitted to the Shed to remove Exhibits, provided the Exhibitor has, *not later than* 11 A.M. *on the last day of the Show*, given written notice to the Secretary to the effect that the Exhibitor or the Exhibitor's representative will attend at the Poultry Shed at 5 P.M. to remove the birds.

JUDGING STOCK AND POULTRY.

Opening Gates. 68. On Tuesday, the first day of the Show, no person will be admitted, except Servants in charge of Stock, till 8 A.M., when the Gates are opened to the public.

Judging. 69. The Judges will commence their inspection at 9.30 A.M. The spaces reserved for the Judging will be enclosed, and no encroachment shall be permitted.

Insufficient merit. 70. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit; and where only one or two lots are presented in a class, and the Judges consider them unworthy of the Premiums offered, it shall be in their power to award a lower prize.

Commendations. 71. In addition to the Premiums, the Judges may award one Very Highly Commended, one Highly Commended, and as many Commended tickets in each class as they consider justified by the number and merit of the entries.

Ayrshire and British Friesian Cows and Heifers. 72. Ayrshire and British Friesian Cows which have not calved before the Show, whether entered in a class for Cows in Milk or for Cows in Calf, shall be judged along with the Cows in Calf, and Ayrshire and British Friesian Cows or Heifers which have calved before the Show—in whichever of the classes entered—shall be judged along with Cows in Milk.

Attending Members' duties. 73. Attending Members will accompany each section of the Judges. It will be the duty of Attending Members to bring the animals out to the Judges and to see that no obstruction is offered to them, and that the space reserved for them is not encroached upon; to ticket the prize animals; to send the Nos. of the prize animals to the Award Lectern near the Secretary's Office; to assist the Judges in completing their return of awards; and should any difficulty arise, to communicate with the Stewards or Secretary.

74. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or attending Member in any class in which he is competing.

DAIRY PRODUCE.

75. Dairy Produce will be received in the Showyard on Monday, the day before the opening of the Show, and till 8 A.M. on Tuesday, the first day of the Show. Judged at 9.30 A.M. on Tuesday. Exhibited Tuesday Wednesday, Thursday, and Friday.

Placing and removing Dairy Produce. 76. Dairy Produce must have been made on the Exhibitor's farm in the year of the Show. No Exhibitor shall show more than one lot in each class. Exhibits of Dairy Produce may be placed before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor a person with written authority from the Exhibitor being present to place or remove exhibits, they will be placed and removed by men hired and paid by the Society, but this will be done on the understanding that the men are hired to do the work on behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to exhibits by errors or accidents in placing, despatching, or conveying exhibits. In the case of exhibits which are not removed by 5.30 P.M. on the closing day of the Show, the Society will hold itself at liberty to hand them over to the railway companies for despatch to the respective Exhibitors.

STALL RENT (INCLUDING ENTRY FEE).

Stall Rent. 77. The Stall Rents (which include Entry Fees) as stated opposite the individual Classes in this List, shall be paid by Exhibitors when making their Entries. The Secretary is instructed to return entries sent without the necessary fees.

FLOORED BOXES AND STALLS.

Floored Stalls for Animals. 78. Exhibitors desiring the boxes, stalls, or pens for their animals to be floored can have this done by giving instructions, stating the Catalogue No., ten days before the opening of the Show, to the Society's Showyard Erector (Mr John Reid, Showyard), to whom the following charges for flooring have to be paid: Horses, 30s. each; Ponies, Cattle, Sheep, and Pigs, 20s. each.

ACCOMMODATION FOR ATTENDANTS

Accommodation for Attendants. 79. Boxes for accommodation of attendants on Stock will, if desired, be provided beside the Stock at a charge of 40s. per box for members and 50s. for non-members. Attendants' boxes will be floored and lined with wood, with door. Applications for attendants' boxes must accompany entries of Stock, and Exhibitors must state the animal next to which the attendants' box is to be placed. Attendants' boxes cannot be guaranteed after the closing date.

IMPLEMENTS AND OTHER ARTICLES.

Admission of Goods. 80. Implements will be received in the Yard from Tuesday, 19th July, till 5 o'clock on the afternoon of Monday, 25th July. Exhibited Tuesday, Wednesday, Thursday, and Friday. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor, and prices must be stated.

Premiums. 81. No Money Prizes or Medals, except when specially offered, will be given by the Society for Implements of any kind.

Refusing Entries. 82. Agricultural Implements, and Implements and collections of articles not Agricultural, will be received for Exhibition, but the Secretary is entitled to refuse Entries from dealers in articles not deemed worthy of Exhibition.

Local Operatives. 83. In order to encourage exhibits of Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show, open space will be provided for these in some less prominent part of the Yard at a charge of 20s. for space 10 feet wide and 20 feet deep.

Articles not entered. 84. Every article to be exhibited must be entered on the Society's Entry Form. Any article not so entered that is taken to the Show is liable to be ordered out of, or removed from, the Showyard, or confiscated to the Society. Exhibitors infringing this rule are moreover liable to a fine of £1.

Selling by auction and noisy behaviour forbidden.

85. "Cheap-Jacks" are not admitted to the Showyard. The selling of goods by auction, shouting, and other behaviour calculated to annoy visitors or Exhibitors, are strictly forbidden. Exhibitors infringing this Regulation are liable to a fine of £1, and to have themselves and their goods ordered out of, or removed from, the Showyard, or to have their goods confiscated to the Society.

Placing Exhibits. Removing Exhibits.

86. The articles of each Exhibitor must all be placed in one stand, except Implements in motion, and must not on any account extend beyond the allotted space. No article shall be moved out of its stand, or the stand dismantled, till the termination of the Show, at 5 P.M. on Friday. Those infringing this Rule shall be liable to a fine of 10s.

Restoring Turf.

87. When the ground requires to be broken, the turf must be carefully lifted and laid aside, and the surface must be restored to the satisfaction of the Society, and at the expense of the Exhibitor. Failing this being done, the Society shall be at liberty to restore the ground and charge the cost to the Exhibitor.

Arranging Exhibits. Signs.

88. Exhibitors must arrange their own articles *within* the space allotted to them before 9 o'clock on Tuesday, and to the satisfaction of the Stewards in charge of the Implement Yard. Exhibitors are prohibited from subletting space allotted to them, and from displaying the name of any other firm on their Stand. All signs, except signs on gables, must face the front only. Nails must not be driven into the canvas.

Handbills.

89. Exhibitors are not allowed to distribute handbills anywhere in the Yard except at their own Stand; and they must not for this or any other purpose encroach upon the adjacent alleys or open spaces.

Sweeping Stands, &c.

90. Exhibitors are required to have their Stands and the portions of the alleys immediately adjoining them swept up before eight o'clock on each morning of the Show.

Fuel.

91. All Machines requiring steam or fire must be entered as such in the Certificate, and will be placed in the Motion Yard. *Coke only shall be used in all cases where fire is required.* Coal shall not be used at any time in the Showyard. Those infringing this Rule shall incur a penalty of £5.

Steam Engines. Motors.

92. No Steam Engine shall be driven in the Yard at a greater speed than 4 miles an hour. Traction Engines shall not be used in conveying Exhibits or other goods into, from one place to another in, or out of the Showyard. Without *written* permission by the Steward of Implements or Secretary, Motor Waggons shall not be used in conveying goods into or out of the Showyard.

Traction Engines.

93. Locomotive and Traction Engines and other Machines must not be moved from their places without permission of the Secretary or Stewards, and must not leave their stands till 6 P.M. on Friday.

Consigning Implements.

94. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement, as well as the number of the Exhibitor's stand.

95. The carriage of all Implements must be prepaid.

Photographing in Showyard.

96. Photographing in the Showyard is not permitted, except by photographers having a Stand in the Showyard or holding a "Photographer's Ticket." The "Photographer's Ticket" may be had from the Secretary, price 20s. It admits the holder to the Show when open to the public and entitles him to photograph in the Showyard, subject to arrangements made by the Stewards. No photographer shall be allowed in the ring during Parades, except with the sanction of the Steward of Parades.

Offices.

97. Covered Booths for Offices (9 feet by 9 feet), purely for business, not for exhibition of goods, can be had for £7 to Members and £10 to Non-Members.

Exhibitors and Attendants' Tickets.

98. Each Exhibitor in the Implement Department who is not a Member of the Society will receive one free Ticket of Admission to the Showyard for himself or a member of his firm, and will receive, in addition, for the use of attendants employed by him at his Stand, two

Tickets of Admission for each complete ten feet of shedding in the Motion Yard, and one Ticket for each complete ten feet of shedding in the other sections. No additional Free Tickets can be issued in any circumstances whatever. Additional Attendants' Tickets, not more than five for one Exhibitor, may be obtained by application in writing by the Exhibitor at 5s. each. *No tickets will be issued without an Order.*

Tickets to be filled up and signed.

99. The Tickets of Admission for Exhibitors and Attendants referred to in the foregoing Regulation will (about fourteen days prior to the Show) be issued to the Exhibitors in blank, with the number of the Exhibitor's Stand. The name of the person for whom each ticket is intended must be written on it before it is used. Each person holding a Free Ticket of Admission must sign his or her name on the back thereof, and must also, when required, sign his or her name in the book at the Entrance Gate. Exhibitors' attendants are strictly cautioned not to lend or transfer their Tickets, which can be used only by the persons whose names they bear, and who must be *bona fide* acting for, or employed by, the Exhibitor. No Ticket is transferable. An Exhibitor is liable to a fine of £1 for each case of transfer or other improper use of a Ticket issued to himself or employee.

Tickets not Transferable.

Improper use of Tickets.

Admission of Supplies for Stand-holders.

100. The following are the arrangements for the admission of Supplies (Refreshments or other goods) for Stand-holders during the Show: Messenger on foot (with or without hand-barrow) with supplies, admitted by Special Ticket; price for one admission, 2s., for the four days, 6s. Horse vehicle and driver with supplies, admitted by Special Ticket; price for one admission, 2s., for the four days, 10s. These Special Tickets may be had from the Secretary. Horse vehicles, with supplies, admitted throughout the day on the first day of the Show; on the other three days they will not be admitted between the hours of 10 A.M. and 5 P.M. except by written permit from the Secretary.

Cycles.

101. The riding of Cycles in the Showyard is prohibited.

Accidents.

102. The Society will not be responsible for any accident that may occur from the machinery belonging to any Exhibitor; and it is a condition of entry that each Exhibitor shall hold the Society harmless, and indemnify it against any legal proceedings arising from any accident caused by his machinery.

Alcoholic Drinks.

103. The giving of Alcoholic Drinks to visitors at Stands in the Show is strictly prohibited.

Gas.

104. Exhibitors desiring the use of gas in the Showyard should apply to the Manager of the Corporation Gas Works, Stirling, not later than Saturday, 11th June.

Space for Stands.

Exhibits not in Motion.

105. Ground to be taken in spaces of 10 feet frontage by 20 feet deep, except in Motion Yard, which is to be 10 feet or larger amount of frontage by 50 feet deep. Exhibitors must take their space in one or other of the following Sections. Space is not let partly covered and partly open. Exhibits not in motion may be excluded from the Motion Yard. The space in the Motion Yard being limited in extent, and intended mainly for exhibits in motion, not more than one-fifth of the space allotted to any one Exhibitor—and in no case more than 400 square feet—may be occupied in the Motion Yard by exhibits not in motion.

Maximum Space.

106. The maximum extent of space which any one Exhibitor may apply for shall be 40 feet of frontage in the Motion Yard, and 100 feet of frontage in the other Sections.

Allocation of space.

107. The Society reserves the right to allot to applicants for Stands either the whole or part of the space they ask for.

108. Exhibitors requiring work executed in connection with the fitting up of stands allotted to them must employ the Society's Showyard Erector—Mr John Reid, 55 Blenheim Place, Aberdeen. The execution of orders received later than one week before the opening of the Show cannot be guaranteed.

109. Rates for space, payable by Exhibitors when making their Entries:—

		Members.	Non-Members.
1.	Open ground without Shedding, 20 ft. deep, per 10 ft.	£2 10 0	£3 10 0
2.	Special open ground, without Shedding, 20 ft. deep, per 10 ft.	4 0 0	5 0 0
3.	Ordinary Shedding, 20 ft. deep, 7 ft. to eave, per 10 ft.	2 10 0	3 10 0
4.	Special Shedding, 20 ft. deep, 7 ft. to eave, per 10 ft.	4 0 0	5 0 0
5.	Ordinary Shedding, 20 ft. deep, 7 ft. to eave, *close boarded at back*, per 10 ft.	3 4 0	4 4 0
6.	Special Shedding, 20 ft. deep, 7 ft. to eave, *close boarded at back*, per 10 ft.	4 14 0	5 14 0
7.	*Motion Yard, without Shedding, 50 ft. deep, per foot	0 10 0	0 16 0
8.	*Motion Yard, with Shedding (10 ft. open behind, 20 ft. covered, and 20 ft. *open in front*), 11 ft. to eave, per foot	0 14 0	1 0 0
9.	Covered Booths for offices, 9 ft. by 9 ft., each	7 0 0	10 0 0
10.	Press offices, 9 ft. by 9 ft., each £5.		

* See Rules 105 and 106.

NEW IMPLEMENTS.

1. An Exhibitor who desires to enter a "New Implement" for competition for the Society's Silver Medal must enter it separately as a "New Implement" at the commencement of the specification of his proposed exhibits; and he must define clearly, on a special form obtainable from the Secretary, the exact nature of the novelty which qualifies such implement to be entered for a Medal. Unless the "New Implement" be properly described in the specification, and particulars of its novelty are given at the time of making the entry, it will not be accepted.

2. For each entry of a "New Implement," sent with an application for space, made in accordance with Regulation 109, a non-returnable Entry Fee of £1 will be charged. Late entries of "New Implements" *only* will, however, be considered up to 9th June, provided that no increase of space beyond that originally allotted to the Exhibitor will be occasioned by such New Implements being shown at his stand.

3. In cases of sufficient merit, the Judges will recommend the award of the Society's Silver Medal to New Implements for agricultural or estate purposes, or to new improvements in such implements. No award shall be made without such trial as may be approved by the Directors.

4. The Society does not bind itself to try in the field every "New Implement" entered for a Silver Medal. Any Exhibitor who expresses a wish to do so can, with the sanction of the Steward of Implements, at his own expense take his New Implement out of the Showyard during the Show week and put it to work, and if within a reasonable distance, the Judges will, if they deem it necessary, inspect it at work and decide if it is worthy of a Silver Medal.

5. No Silver Medals will be awarded to, nor can any entry as New Implements be accepted of, machines of any class for which competitive trials have been announced by the Society as about to take place.

6. The Judges of New Implements will commence their inspection at 2.30 P.M on Tuesday, 26th July, and will take in rotation the stands of the exhibitors who have entered New Implements for the Society's Silver Medals. A notice will be posted at the Secretary's Office each evening giving the number of the stand at which the Judges will commence their inspection next morning. Each Exhibitor, or his represent-

ative, will be expected to be at the stand to explain the working of the Implement to the Judges. If the exhibit be not ready and in working order by the time the Judges make their inspection, it is liable to be struck off the list.

7. All publications by exhibitors of the award of the Society's Silver Medals must state the year of the award, and must specify the exact nature of the "New Implement," of the improvement, or of the attachment to an Implement, for which the Silver Medal has been awarded.

8. On the recommendation of the Judges, with the approval of the Directors, any New Implement of merit, which cannot be sufficiently tried, or which is capable of further development, may be entered and exhibited as a "New Implement" at the succeeding Show of the Society.

9. The Judges' decision, when duly accepted and recorded, will in all cases be final.

RESERVED SEATS (NUMBERED) IN GRAND STAND.

For Charges and Tickets, apply to Secretary.

Booking-Office in Showyard behind Grand Stand.

ADMISSION OF THE PUBLIC.

The public will be admitted daily at 8 A.M. Judging begins on Tuesday at 9.30 A.M. The charges for admission to the Yard will be—Tuesday, from 8 A.M. till 5 P.M., 7s. 6d. Wednesday, from 8 A.M. till 5 P.M., 5s.; Thursday, from 8 A.M. till 5 P.M., 3s.; from 5 P.M. till 8 P.M., 1s. 6d. Friday, from 8 A.M. till 5 P.M., 2s.

On Thursday and Friday children under twelve years of age admitted at 1s.

No Pass-out Checks given, and no re-admission without payment.

Season Tickets—15s. each.

ADMISSION OF MEMBERS AND EXHIBITORS.

On exhibiting their "*Member's Badge*," which is strictly not transferable, Members of the Society are admitted free to the Showyard. Badges will be sent to all Members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. **All Members not producing their badges must pay at the gates, and the admission money will not on any account be returned.** Badges must be signed by Members before being presented at the gate, and Members should continue to wear the badge during the whole time that they are in the Showyard.

Tickets of admission to the Showyard are sent to Exhibitors of Stock, Poultry, and Dairy Produce (not Members) whose Entry Fees amount to not less than 20s.

For Exhibitors of Implements and their assistants tickets are issued as provided in the Regulations for Implements.

VARIOUS.

Exhibitors may display their own Placards *inside and in front of* their stands; with this exception, no Bills of any kind other than those of the Society are permitted on any of the Show erections. No newspapers or any other articles to be carried about the Yard for sale or display.

No Carriages or Equestrians admitted without special leave from the Directors, and then only for Invalids. Bath-chairs may be brought in.

Premium Lists, Regulations, and Certificates of Entry may be obtained by applying at the Secretary's Office, No. 3 George IV. Bridge, Edinburgh.

All Communications should be addressed to The Secretary of the Highland and Agricultural Society of Scotland, No. 3 George IV. Bridge, Edinburgh. From 20th to 28th July, to the Secretary's Office, Showyard, Stirling.

Address for Telegrams—"SOCIETY," EDINBURGH.
Telephone No.—CENTRAL 3655.

RAILWAY ARRANGEMENTS.

The Railway Companies will be furnished with a list of the Exhibitors of Stock and Implements, after the 6th July. All applications for horse-boxes and trucks, and for information as to train arrangements, must be made by the Exhibitors themselves to the Stationmaster where their stock is to be trucked.

The arrangements made by the Railway Companies for the conveyance of Live Stock and Goods to and from the Show are **indicated** *below, but exhibitors are recommended to apply to the respective companies for* **full particulars**:—

1. Live Stock and Goods *to* the Show to be charged ordinary rates.

2. Live Stock and Goods *from* the Show, if sold, to be charged ordinary rates.

3. Live Stock from the Show, if unsold, to be carried at half-rates back to the Station whence the animals were sent, at owner's risk, on surrender of a certificate from the exhibitor to the effect that they are really unsold; failing surrender of such certificate, ordinary rates will be charged.

4. Poultry to be charged ordinary rates both ways, and will not be accepted for conveyance unless the carriage charges are prepaid.

5. Horse-boxes, or other Passenger Train vehicle, will not be provided for the carriage of Live Stock sent by Goods Train and invoiced at Goods Train rates. *For rates for Horse-boxes by Passenger and Special Trains, apply to the Railway Companies.*

6. Provender conveyed to Agricultural Shows with Live Stock by Passenger Train Service will be charged at the applicable rates, subject to a free weight allowance, viz.—

Cattle	per animal,	56 lb.
Horses	,,	56 ,,
Sheep, goats, lambs, pigs, and calves .	,,	28 ,,

(not applicable by Goods Train).

7. The ordinary rates charged for carriage do not in any case include delivery *to*, or collection *from*, the Show-ground.

8. Tents, Canvas, and other articles to be charged the ordinary rates both going and returning.

9. The carriage of all Live Stock, Implements, and other articles going to the Show for exhibition must be PREPAID; and the carriage on all traffic *returned from the Show by Passenger Train Service must be PREPAID.*

The carriage charges on Live Stock conveyed in special vehicles by Passenger Train and intended to be returned to the original sending Station may also be prepaid for the return journey at the original sending Station if the owner so desires.

The Railway Charge on all exhibits which are conveyed by Passenger Train in the Guard's Van and intended to be returned from the Show direct to the original sending Station must be PREPAID, for both the outward and return journey, at the original sending Station. The agreed form of address label for Poultry, Dairy Produce, Bee Appliances, and Wool exhibits, which will be supplied through the Secretary of the Society, must be used in such cases

10. Carriages and other Road Vehicles are only conveyed by Passenger Train when this can be conveniently done.

11. Attendants in charge of Live Stock are conveyed free in the cases shown below, when certified by the owners to be *bona fide* in charge of such Live Stock:—

In Horse-Boxes.—Horses and Cattle: One man for each consignment, except where the consignment requires more than one vehicle, when one man to each vehicle may be sent free; but where two or three Horses or Cattle forming one consignment are sent in the same Horse-box and a man is required to travel with each animal, a man for each animal may be conveyed free, provided each animal is charged for separately.

In Horse-Boxes.—Small animals: One man to each vehicle.

DELIVERY AND COLLECTION CHARGES.

The following will be the Charges for the Delivery or Collection of Live Stock, Implements, and other articles between the Railway Station at Stirling and the Show-ground:—

General traffic, 6s. 9d. per ton (minimum charge per consignment, 2s. 3d.)

Implements and Machinery (Agricultural), not exceeding 1 ton each, 7s. 9d. per ton (minimum charge per delivery, 3s. 6d.)

Implements and Machinery (Agricultural), on their own wheels (specially hauled), not exceeding 1 ton, 7s. 9d. each.

When hauled on their own wheels behind a lorry, loaded or partly loaded with other goods, actual weight to be charged at 7s. 9d. per ton.

Single articles, exceeding 1 ton but not exceeding 3 tons, 9s. per ton.

Single articles, exceeding 3 tons but not exceeding 5 tons, 12s. 6d. per ton.

Single articles, exceeding 5 tons, by special arrangement only, but no less charge than 16s. 3d. per ton.

Rustic Houses, by special arrangement only, but no less charge than 14s. 6d. per load.

Carriages, four-wheeled, 9s. each.

Carriages, two-wheeled, 7s. 3d. each.

Cattle, in floats, 6s. 9d. per head; minimum charge, 9s.

Sheep, Goats, and Pigs, in floats, 1s. 9d. per head (minimum charge 9s. for each consignment).

Pigs in crates, 3s. 6d. per crate (minimum, 6s. 9d. per load).

*Poultry in crates or hampers, 9d. per crate or hamper.

Ordinary Parcels by Passenger Train, 6d. each.

Miscellaneous Passenger Train Traffic, including packages of plants and flowers, carried at O.R. rates S. to S., 9d. per cwt. (minimum, 1s. 6d. per consignment).

*** Poultry exhibits will be conveyed at the Society's expense from the Railway Station to the Showyard and back, but no exhibit subject to railway charges will be received by the Society.**

REGULATIONS FOR GOAT CLASSES.

The animals will be milked dry at 6 o'clock on the evening previous to the opening of the Show, in the presence of, and to the satisfaction of, the Steward or a representative of the Society duly authorised by him.

Kids must be entered in the Kid Register of the British Goat Society. Goatlings must be entered either in the Kid Register or the Show Register, whilst all other Goats must be entered in either of these Registers or the Herd Book before being exhibited at this Show.

MILKING COMPETITION—CLASS 118.

The animals will be milked at 5 P.M. on Tuesday, 26th July, at an appointed place in the order arranged by the Steward, and the milk of the next twenty-four hours will be taken for the trials.

All Goats must have kidded within twelve months of the first day of the Show.

The prizes will be awarded according to the following scale of points:—

For each pound of milk . . . . 1 point.
For each 6 days the Goat has been in milk (deducting the first forty days after kidding), with a maximum of 6 points . . . . $\frac{1}{10}$ of a point.
For each ¼ lb. of fat in the milk . . . . . . 5 points.
For each ¼ lb. of solids, other than fat, in the milk . 1 point.
In cases where the milk contains less than 3 per cent of fat 1 point will be deducted.

The period of lactation to be calculated from the date of kidding to the first day of the Show. No prize will be awarded to a goat giving less than 4 lb. of milk per day.

Fractions of lbs. of milk, percentage of fat, of solids other than fat and incomplete periods of less than 6 days, to be worked out in decimals and added to the total points.

A Certificate giving the last date of kidding, signed by the owner of the Goat exhibited, or his Agent, must in every case be brought to the Steward of Goats as soon as possible after the animal has arrived in the Showyard.

The milk yielded by Goats in the Showyard shall be the property of the Society.

BEE APPLIANCES AND HONEY, &c.

Rules and Regulations.

1. All exhibits must be despatched in time to be delivered at the Showyard not later than 6 P.M. on Monday, 25th July. According to railway regulations exhibitors will require to pay return carriage when despatching. Return carriage paid labels will be supplied by the Secretary. Non-compliance with this regulation will mean that the exhibit will be left in the Showyard. Boxes containing jars or sections must be screwed and not nailed, and the bottles and sections so placed that they can be lifted out and replaced without disturbing the packing.

2. The number of the exhibit will be sent by the Secretary (as entered on the admission ticket), and must be placed on every exhibit and on each detachable part of exhibit—viz., on the several parts of each Hive, on every jar of Extracted Honey. The number must be gummed on the jar and not on the cap. No goods will be allowed to be staged unless this rule is complied with.

3. No card, trade mark, or name of the exhibitor may be placed upon any part of an exhibit. Every article exhibited must be the property of the exhibitor, and all honey must have been gathered in the natural way within the United Kingdom, by bees the property of the exhibitor.

4. Comb Honey must be glazed on both sides, to protect the honey from injury. If paper edging is used, it must be of such a width as to leave 3½ inches by 3½ inches of glass clear of the lace paper, or in any other neat way capable of easy removal by the judges, such as in small boxes glazed on both sides.

5. All Run Honey or Extracted Honey and Granulated Honey must be shown in Glass Jars holding approximately 1 lb., except in Class 12.

6. No exhibitor shall be allowed to take more than one prize in any one class.

7. The Judge shall be empowered to withhold prizes in case of insufficient merit.

8. Should there be in any class three or less than three entries, the 1st prize will be withdrawn. The 2nd will rank as 1st, the 3rd as 2nd, and a highly commended as 3rd.

SILVER MEDALS FOR NEW OR IMPROVED IMPLEMENTS.

See Regulations on page 73.

FORESTRY EXHIBITION.

For information as to above, apply to the Secretary, Royal Scottish Arboricultural Society, 8 Rutland Square, Edinburgh.

WOOL DEMONSTRATIONS.

Arrangements are being made for Demonstrations on Wool, to be held in the Wool Shed on Wednesday, Thursday, and Friday, 27th, 28th, and 29th July.

The Society's Show for 1922 will be held at Dumfries.

THE PRESIDENT'S CHAMPION MEDALS

A Champion Medal is given by His Grace THE DUKE OF MONTROSE, K.T., President of the Society, for the *best Animal* in each of the following sections :—

1. Shorthorn.
2. Aberdeen-Angus.
3. Galloway.
4. Highland.
5. Ayrshire.
6. British Friesian.
7. Clydesdale Stallion.
8. Draught Gelding.
9. Clydesdale Mare and Filly.
10. Hunter.
11. Hackney.
12. Pony.
13. Highland Pony.
14. Western Island Pony.
15. Shetland Pony.
16. Harness Horse.
17. Blackface Sheep.
18. Cheviot.
19. Border Leicester.
20. Half-bred.
21. Oxford-Down.
22. Suffolk.
23. Shropshire.
24. Goat.
25.
26. Middle White.
27. Berkshire.
28. Large Black.
29. Gloucestershire Old Spots.
30. Cumberland.

NOTE.—*Animals entered as Extra Stock may compete for these Medals. Former Winners of the President's Medals are eligible. The Society shall have the right to photograph the Winners for publication in the 'Transactions.' At this Show no animal can be awarded more than one of these Medals.*

*CATTLE

SHORTHORN

President's Medal for best Shorthorn

Entry Fees *Members*	*Entry Fees* *Non-Members*	*Class*		*Premiums* *First* £	*Premiums* *Second* £	*Premiums* *Third* £	*Premiums* *Fourth* £
		–	[1] **Renfrewshire Perpetual Gold Challenge Cup,** value £250, for best animal of the Shorthorn breed, "Extra Stock" being eligible to compete.				
			[2] **The Duthie Perpetual Challenge Cup,** value £150, for best animal in the Shorthorn Classes, "Extra Stock" being eligible to compete.				
			[3] **Tweeddale Gold Medal** for best Shorthorn Bull.				
30/-	50/-	1	**Bull** calved before 1919	15	10	5	3
30/-	50/-	2	**Bull** calved in 1919	15	10	5	3
30/-	50/-	3	**Bull** calved in 1920	12	8	4	2
			[4] **The Emilio R. Casares, jun., "Junior Champion Challenge Cup,"** value £50, for best Shorthorn Bull in Class 3, calved on or after 1st April of the year preceding the Show, that has passed the tuberculin test.				
			[5] **Best Shorthorn Bull in the Show,** entered or eligible for entry in Coates's Herd-Book—*£20.*				
			[6] **Silver Medal** to the Breeder of the winner of above Prize.				
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				

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* See Rules 32 and 33.

[1] This Cup, along with an endowment of £500, was provided from money collected in Renfrewshire by the late Provost Muir MacKean of Paisley, and is in commemoration of the Society's first Show in the county of Renfrew in 1913. This year the Cup is offered for the best animal of the Shorthorn breed. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

[2] This Cup, along with an endowment fund, was gifted by Mr William Duthie, Collynie. The Cup may not be won on more than one occasion with the same animal. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica as a memento of his winning the Cup.

[3] Annual Free Income from Fund of £500.

[4] Given by Mr Emilio R. Casares, jun., London. This Cup will become the property of the Exhibitor who shall win it three times, not necessarily in succession. A Silver Medal will be awarded to the winner each year.

[5] **Given by the Shorthorn Society.**

ENTRY FEES		*CLASS*	CATTLE	*PREMIUMS*			
Members	*Non-Members*		**SHORTHORN**—*continued*	*First*	*Second*	*Third*	*Fourth*
				£	£	£	£
30/-	50/-	4	**Cow** calved before 1919, in Milk . . .	12	8	4	2
30/-	50/-	5	**Heifer** or **Cow** calved in 1919 . . .	10	5	3	2
30/-	50/-	6	**Heifer** calved in 1920	10	5	3	2
			[1] **Best Shorthorn Female in the Show,** entered or eligible for entry in Coates's Herd-Book—£20.				
			Silver Medal to the Breeder of the winner of above Prize.				
			PRIZE MONEY BY SOCIETY . £158				
			CONTRIBUTED PRIZES . . 40				
			ABERDEEN-ANGUS				
			President's Medal for best Aberdeen-Angus Animal				
30/-	50/-	7	**Bull** calved before 1st Dec. 1918 . . .	15	10	5	3
30/-	50/-	8	**Bull** calved on or after 1st Dec. 1918 . .	15	10	5	3
30/-	50/-	9	**Bull** calved on or after 1st Dec. 1919 . .	12	8	4	2
			[2] **Ballindalloch Challenge Cup,** value £50, for the best Bull of any age in the three Classes.				
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				
			Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.				
30/-	50/-	10	**Cow** of any age in Milk	12	8	4	2
			[2] **Ballindalloch Challenge Cup,** value £50, for the best Cow of any age in the above Class.				
			Breeder of the Winner of the Ballindalloch Challenge Cup—The Silver Medal.				
30/-	50/-	11	**Heifer** calved on or after 1st Dec. 1918 . .	10	5	3	2
30/-	50/-	12	**Heifer** calved on or after 1st Dec. 1919 . .	10	5	3	2
			[3] **Champion Gold Medal,** for best animal in the breeding Classes, breeding animals shown as "Extra Stock" being eligible to compete.				
			PRIZE MONEY BY SOCIETY . £158				

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[1] Given by the Shorthorn Society.

[2] "The Ballindalloch Challenge Cups," value £50 each, are offered for the best Bull of any age and best Cow of any age (Heifers excluded) in the Aberdeen-Angus classes, the former presented by the late Sir George Macpherson Grant, Bart., and the latter by the late Sir John Macpherson Grant, Bart. Each Cup will become the property of the Exhibitor who shall win it five times, not necessarily in succession. The breeder of the successful animals each year will receive the Society's Silver Medal, with suitable inscription.

[3] Given by the Aberdeen-Angus Cattle Society.

ENTRY FEES		*CLASS*		*PREMIUMS*			
Members	*Non-Members*		**CATTLE** **GALLOWAY**	*First*	*Second*	*Third*	*Fourth*
			President's Medal for best Galloway	£	£	£	£
30/-	50/-	13	**Bull** calved before 1st Dec. 1918	15	10	5	3
30/-	50/-	14	**Bull** calved on or after 1st Dec. 1918	15	10	5	3
30/-	50/-	15	**Bull** calved on or after 1st Dec. 1919	12	8	4	2
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				
30/-	50/-	16	**Cow** of any age in Milk	12	8	4	2
30/-	50/-	17	**Heifer** calved on or after 1st Dec. 1918	10	5	3	2
30/-	50/-	18	**Heifer** calved on or after 1st Dec. 1919	10	5	3	2
			[1] **Dr Gillespie Memorial Challenge Trophy**, value £50, for best Galloway Animal in the breeding Classes, breeding Animals shown as "Extra Stock" being eligible to compete—see conditions below.				
			PRIZE MONEY BY SOCIETY . £158				
			HIGHLAND				
			President's Medal for best Highland Animal				
30/-	50/-	19	**Bull** calved before 1919	15	10	5	3
30/-	50/-	20	**Bull** calved in 1919	15	10	5	3
30/-	50/-	21	**Bull** calved in 1920	12	8	4	2
			[2] **Perpetual Victory Challenge Cup**, approximate value 50 Guineas, for the best animal in the male Classes, "Extra Stock" being eligible to compete.				
			Breeder of best Bull of any age in the three Classes—The Silver Medal.				
30/-	50/-	22	**Cow** of any age in Milk	12	8	4	2
30/-	50/-	23	**Heifer** calved in 1918	10	5	3	2
30/-	50/-	24	**Heifer** calved in 1919	10	5	3	2
			[2] **Perpetual Victory Challenge Cup**, approximate value 35 Guineas, for the best animal in the female Classes, "Extra Stock" being eligible to compete.				
			PRIZE MONEY BY SOCIETY . . £158				

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[1] This Trophy is offered by the Galloway Cattle Society of Great Britain and Ireland (subject to the conditions of that Society) for the best Galloway animal registered in the Galloway Herd-Book, entered in any of the Breeding classes, at the Show or Shows at which it may be competed for. The winner of the Trophy shall, before delivery thereof is made to him, give security to the Galloway Cattle Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner on each occasion will receive the Galloway Cattle Society's Silver Medal as a memento of his winning the Trophy.

[2] Given by the Highland Cattle Society of Scotland.

CATTLE

AYRSHIRE

Exhibitors are invited to produce evidence of the Milk Yield of Cows, and the Milking Pedigree of Bulls and younger females. This evidence should be in the form of a Certificate signed by the Secretary of the Milk Records Association. It must be lodged at the time of Entry, and will be made available to the Judges for their information.

President's Medal for best Ayrshire

ENTRY FEES				*PREMIUMS*		
Members	*Non-Members*	*CLASS*		*First*	*Second*	*Third*
				£	£	£
50/-	70/-	25	[1] **Cow** in Milk,* calved before 1918	12	8	4
50/-	70/-	26	[1] **Cow** in Milk,* calved after 1st Jan. 1918	10	7	3
50/-	70/-	27	[1] **Cow** of any age in Calf,* or Heifer, calved in 1918, in Calf and due to calve within nine months after the Show	10	7	3
30/-	50/-	28	**Heifer** calved in 1919	10	5	3
30/-	50/-	29	**Heifer** calved in 1920	8	5	3
			[2] **Special Prize of £10** for the best Female Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than 1st June 1921.			
30/-	50/-	30	**Bull** calved before 1919	12	8	4
30/-	50/-	31	**Bull** calved in 1919	10	7	3
30/-	50/-	32	**Bull** calved in 1920	8	5	3
			Breeder of best Bull of any age in Classes 30, 31, and 32—The Silver Medal.			
			MILK RECORD CLASS			
30/-	50/-	33	[3] **Bull,** any age, the progeny of an Ayrshire Cow having an authenticated milk yield—[4] Premiums (No extra fee if in Class 30, 31, or 32)	15	10	5
			[2] **Special Prize of £10** for the best Male Animal of the Ayrshire breed entered with a number in the Ayrshire Cattle Herd-Book not later than 1st June 1921.			
			PRIZE MONEY BY SOCIETY . . £158 CONTRIBUTED PRIZES . . . 50			

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* See Rule 72.

[1] Cows in these Classes must have produced a calf within fifteen months prior to the Show.

[2] Given by the Ayrshire Cattle Herd-Book Society.

[3] Animals entered in this Class must be the progeny of dams certified by the Secretary of the Scottish Milk Records Association to have produced, as cows, at least once, not less than 1000 gallons, or as heifers, not less than 850 gallons of milk, averaging not less than 3·5 per cent of butter fat, within a lactation period not exceeding 52 weeks preceding calving, or alternatively, 40 weeks after calving. The sire of any bull entered must be out of a dam with a similar milk record. Forms of certificate will be issued on application to the Secretary of the Highland and Agricultural Society. Animals already entered in Classes 30, 31, and 32 may be entered in Class 33 without additional fee.

[4] Given by the Board of Agriculture for Scotland.

CATTLE

BRITISH FRIESIAN

Entry Fees		*Class*		*Premiums*		
Members	*Non-Members*			*First*	*Second*	*Third*
				£	£	£
			President's Medal for best British Friesian Animal			
			[1] **Silver Bowl**, value £25, for the three best animals in the British Friesian Classes got by the same sire, and exhibited by, but not necessarily bred by, one exhibitor.			
30/-	50/-	34	**Bull** calved in or before 1918	10	5	3
30/-	50/-	35	**Bull** calved in 1919	10	5	3
30/-	50/-	36	**Bull** calved in 1920	10	5	3
			Champion Prize of £5 given by the British Friesian Cattle Society for the best male exhibited.			
30/-	50/-	37	[2] **Cow** in milk,* calved in or before 1917 . .	10	5	3
30/-	50/-	38	**Heifer** in milk, calved in 1918 or 1919 . .	10	5	3
30/-	50/-	39	**Heifer** in calf, with her first calf to calve before 3 years old	10	5	3
30/-	50/-	40	**Heifer** calved in 1920.	10	5	3
			Champion Prize of £5 given by the British Friesian Cattle Society for the best female exhibited.			

Prize Money by Society . . .	£73
[3] Contributed Prizes	63

Prize Money by Society . .	£863	0
Contributed	153	0
Cups, Medals &c. . . .	749	5
Total Prizes for Cattle .	£1765	5

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* See Rule 72.

[1] Given by Mr Adam Smith, Lochlands, Larbert.

[2] Cows in this Class must have produced a calf within fifteen months prior to the Show.

[3] £63 contributed by the British Friesian Cattle Society.

[1]HORSES

FOR AGRICULTURAL PURPOSES

DRAUGHT STALLIONS

President's Medal for best Clydesdale Stallion or Colt

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First £	PREMIUMS Second £	PREMIUMS Third £	PREMIUMS Fourth £
			[2]**Paisley Perpetual Gold Challenge Cup,** value £300, for best Clydesdale Stallion or Colt, "Extra Stock" being eligible to compete.				
60/-	80/-	41	**Stallion** foaled before 1918	20	15	10	4
60/-	80/-	42	**Entire Colt** foaled in 1918	20	15	10	4
60/-	80/-	43	**Entire Colt** foaled in 1919	20	15	10	4
45/-	65/-	44	**Entire Colt** foaled in 1920	15	10	6	4
			[3]**William Taylor Memorial Prize of £10 and Certificate** to the breeder of the best Clydesdale Colt entered in Classes 43 or 44.				
			Breeder of best Male Animal of any age in Classes 41, 42, 43, and 44—The Silver Medal.				
			PRIZE MONEY BY SOCIETY . £182				
			CONTRIBUTED PRIZES . . 10				

DRAUGHT GELDINGS

President's Medal for best Draught Gelding

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First £	PREMIUMS Second £	PREMIUMS Third £	PREMIUMS Fourth £
45/-	65/-	45	**Draught Gelding** foaled before 1918	10	5	3	–
45/-	65/-	46	**Draught Gelding** foaled in 1918	6	4	3	–
45/-	65/-	47	**Draught Gelding** foaled in 1919	6	4	3	–
			PRIZE MONEY BY SOCIETY . £44				

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[1] **For prizes given by the Society, no animal is allowed to compete in more than one Class except that horses entered in other Classes may also compete in the Jumping and Driving Classes.**

[2] This Cup, along with an endowment of £600, was provided from money collected in Paisley by the late Provost Muir M'Kean, and is in commemoration of the Society's first Show at Paisley in 1913. This year the Cup is offered for the best Clydesdale Stallion or Colt. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

[3] Given by William Taylor Memorial Committee.

• **Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.**

HORSES

ENTRY FEES		CLASS		PREMIUMS			
Members	Non-Members			First	Second	Third	Fourth
			DRAUGHT MARES AND FILLIES	£	£	£	£
			President's Medal for best Clydesdale Mare or Filly				
60/-	80/-	48	**Mare** of any age, with Foal at foot	20	12	7	4
45/-	65/-	49	**Yeld Mare** foaled before 1918	12	9	6	4
45/-	65/-	50	**Yeld Mare or Filly** foaled in 1918	12	9	6	4
45/-	65/-	51	**Filly** foaled in 1919	12	9	6	4
45/-	65/-	52	**Filly** foaled in 1920	12	9	6	4
			Best Clydesdale Mare or Filly—Cawdor Challenge Cup, value 50 guineas. See Conditions below.[1]				
			PRIZE MONEY BY SOCIETY . £167				
			Total Prize Money for Draught Horses, £403				
			HUNTERS				
			President's Medal for best Hunter				
60/-	80/-	53	**Hunter Brood Mare,** with Foal at Foot . .	15	7	3	–
45/-	65/-	54	**Yeld Mare, Filly, or Gelding,** for field, foaled in 1918—*in hand*	10	5	3	–
45/-	65/-	55	**Yeld Mare, Filly, or Gelding,** for field, foaled in 1919—*in hand*	10	5	3	–
45/-	65/-	56	**Colt, Gelding, or Filly,** foaled in 1920, the produce of thoroughbred Stallion or registered Hunter sire, out of Mare of any breed . . .	10	5	3	–
			[2] **Best Hunter Filly,** not exceeding three years old, registered with a number in the Hunter Stud-Book, or the entry tendered within a month of the award—Champion Gold Medal				
			PRIZE MONEY BY SOCIETY . £79				

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[1] This Cup is offered by the Clydesdale Horse Society of Great Britain and Ireland (subject to the conditions of that Society) for the best Clydesdale Mare or Filly registered in the Clydesdale Stud-Book, entered in any of the Draught Horse Classes, at the Show at which it may be competed for. The Cup must be won four times by an Exhibitor with different animals (but not necessarily in consecutive years) before it becomes his absolute property. The animal winning this Cup must be certified free from hereditary disease. The winner of the Cup, other than the absolute winner, shall, before delivery thereof is made to him, give security to the Clydesdale Horse Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. Until the Cup be won outright, the winner on each occasion will receive the Clydesdale Horse Society's Silver Medal as a memento of his winning the Cup.

[2] Given by the Hunters' Improvement and National Light Horse Breeding Society.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

ENTRY FEES		*CLASS*		*PREMIUMS*		
Members	*Non-Members*			*First* £	*Second* £	*Third* £
			HORSES			
			HACKNEYS			
			(*All to be shown in hand*)			
			President's Medal for best Hackney in Classes 57 *to* 61			
60/-	80/-	57	**Brood Mare**, over 14 hands, with Foal at foot, or to foal this season to a registered sire	10	6	4
45/-	65/-	58	**Yeld Mare or Filly** foaled in 1918	8	5	3
45/-	65/-	59	**Entire Colt or Filly** foaled in 1919	8	5	3
45/-	65/-	60	**Entire Colt or Filly** foaled in 1920	8	5	3
			[1] **Champion Prize of £10** is offered by the Hackney Horse Society for best Mare or Filly in Hackney or Pony Classes, animals entered as "Extra Stock" being eligible.			
60/-	80/-	61	**Stallion** foaled in or before 1918, over 14 hands	10	6	4
			All animals entered in the above Hackney Classes must be registered in the Hackney Stud-Book except in Class 60, which must be eligible for entry. Entry forms must be accompanied by certificate to this effect from Mr F. F. Euren, 12 Hanover Square, London, W.			
			PRIZE MONEY BY SOCIETY . £88			
			CONTRIBUTED PRIZES . . 10			
			PONIES			
			(*Classes* 62 *to* 64 *will be judged by Hackney Judge*)			
			President's Medal for best Pony			
45/-	65/-	62	**Stallion**, 3 years old and upwards, 14 hands and under—*in hand*	5	3	2
45/-	65/-	63	**Yeld Mare, Filly, or Gelding**, 3 years old and upwards, over 13 and not over 14 hands—*in saddle*	5	3	2
45/-	65/-	64	**Yeld Mare, Filly, or Gelding**, 3 years old and upwards, not over 13 hands—*in saddle*	5	3	2
			(*See Champion Prize under Hackneys, above*)			
			PRIZE MONEY BY SOCIETY . . £30			

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[1] A Mare 6 years old or more must have had a living foal. Winners of the Hackney Society's £10 Prize or Gold Medal in 1921, except at the London and Royal English Shows, excluded. The winner must be entered or accepted for entry in Hackney Stud-Book and certified free from hereditary disease.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

ENTRY FEES		*CLASS*		*PREMIUMS*			
Members	*Non-Members*			*First* £	*Second* £	*Third* £	*Fourth* £
			HORSES				
			[1] HIGHLAND PONIES				
			(*To be judged at* 1.30 P.M. *on Tuesday, 26th July*)				
			President's Medal for best Highland Pony				
45/-	65/-	65	**Stallion,** 3 years old or upwards, not exceeding 14.2 hands	8	4	2	–
45/-	65/-	66	**Mare,** 3 years old or upwards, not exceeding 14.2 hands, yeld or with Foal at foot . . .	8	4	2	–
45/-	65/-	67	**Entire Colt,** foaled after 1st January 1919 . .	6	4	2	–
45/-	65/-	68	**Filly,** foaled after 1st January 1919 . .	6	4	2	–
			(*See Special Prize below.*)				
			PRIZE MONEY BY SOCIETY . . £52				
			WESTERN ISLAND PONIES				
			(*To be judged at* 1.30 P.M. *on Tuesday, 26th July*)				
			President's Medal for best Western Island Pony				
45/-	65/-	69	**Stallion,** 3 years old or upwards, not exceeding 14.2 hands	8	4	2	–
45/-	65/-	70	**Mare,** 3 years old or upwards, not exceeding 14 2 hands, yeld or with Foal at foot . . .	8	4	2	–
45/-	65/-	71	**Entire Colt,** foaled after 1st January 1919 . .	6	4	2	–
45/-	65/-	72	**Filly,** foaled after 1st January 1919 . . .	6	4	2	–
			[2] **Special Prize of £15** for the best Highland or Western Island Stallion, Mare, Colt, or Filly, entered or accepted for entry in the Highland Section of the National Pony Stud-Book, "Extra Stock" being eligible to compete. Competition to be strictly confined to animals passed sound and free from hereditary disease.				
			PRIZE MONEY BY SOCIETY . . £52				
			CONTRIBUTED PRIZES . . . 15				
			SHETLAND PONIES				
			(*To be judged at* 1.30 P.M. *on Tuesday, 26th July*)				
			(*All to be shown in hand*)				
			President's Medal for best Shetland Pony				
40/-	60/-	73	**Stallion,** not exceeding 10½ hands, foaled before 1918	8	5	3	2
40/-	60/-	74	**Entire Colt,** not exceeding 10½ hands, foaled in 1918 or 1919	8	5	3	2
40/-	60/-	75	**Mare,** not exceeding 10½ hands, with Foal at foot .	8	5	3	2
40/-	60/-	76	**Yeld Mare,** not exceeding 10½ hands . .	8	5	3	2
40/-	60/-	77	**Filly,** not exceeding 10½ hands, foaled in 1918 or 1919	8	5	3	2
			[3] **Shetland Pony Foal,** exhibited along with dam in Class 75	5	3	2	–

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[1] The Board of Agriculture for Scotland gives £40 towards prizes for Highland Ponies.

[2] Given by the National Pony Society.

[3] Given by "Four Lovers of the Breed," per Mr W. Mungall of Transy.

Stallions and Colts, 2 years old and upwards, must be licensed for stud purposes. See Rule 39.

Entry Fees		*Class*	**HORSES**	*Premiums*			
Members	*Non-Members*			*First*	*Second*	*Third*	*Fourth*
				£	£	£	£
			SHETLAND PONIES—*continued*				
			[1] **Silver Medal** for the best Shetland Pony of the sex opposite to that of the winner of the President's Medal, entered or eligible for entry in the Shetland Pony Stud-Book.				
			Prize Money by Society . . £90 Contributed Prizes . . 10				
			[2] **HORSES IN HARNESS**				
			(*To be judged at* 2.30 p.m. *on Tuesday, 26th July*)				
			[3] *President's Medal for best animal in the Classes for Horses in Harness*				
			* **NOVICE CLASSES**				
45/-	65/-	78	**Pony, Mare or Gelding**, any age, in Harness, not exceeding 14 hands, to be driven in the ring .	10	7	5	3
45/-	65/-	79	**Mare or Gelding**, any age, in Harness, over 14 and not exceeding 15 hands, to be driven in the ring	10	7	5	3
45/-	65/-	80	**Mare or Gelding**, any age, in Harness, over 15 hands, to be driven in the ring . . .	10	7	5	3
			(No Fourth Prize will be awarded unless there are five Entries forward).				
			* Animals entered in the Novice Classes must not have won a prize in Harness exceeding £5 prior to the date of closing of entries (9th June 1921).				
			OPEN CLASSES				
45/-	65/-	81	**Pony, Mare or Gelding**, any age, in Harness, not exceeding 14 hands, to be driven in the ring .	12	8	4	–
45/-	65/-	82	**Mare or Gelding**, any age, in Harness, over 14 and not exceeding 15 hands, to be driven in the ring	20	10	4	–
45/-	65/-	83	**Mare or Gelding**, any age, in Harness, over 15 hands, to be driven in the ring . . .	20	10	4	–
			[4] **Champion Prize of £5** for the best animal in the Harness Classes.				
			Prize Money by Society . . £47 [5] Contributed Prizes . . 125				
			Prize Money by Society . . £791 Contributed . . . . . 210 Cups, Medals, &c. 363				
			Total Prizes for Horses . £1364				

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[1] Given by the Shetland Pony Stud-Book Society.

[2] Animals entered in other Classes may be entered in the Harness Classes at an additional fee of 5s. if they are eligible.

[3] *An animal that has won a President's Medal in another section in this Show shall not be eligible to compete for the Medal in this section.*

[4] Given by the Hackney Horse Society, per Mr William S. Miller, Balmanno Castle, Bridge of Earn.

[5] Collected per Mr William S. Miller, Balmanno Castle, Bridge of Earn.

Shed accommodation for machines for Driving Competitions—Members, 10s.; Non-Members, 20s

JUMPING COMPETITIONS

SPECIAL REGULATIONS

(See also the Regulations on pages 63 *to* 70)

1. Jumping Competitions will take place on the afternoons of Wednesday, Thursday, and Friday, the 27th, 28th, and 29th July, and on the evening of Thursday, 28th July.
2. *Entries* for each day's Competitions will close at the Secretary's Office in the Showyard at 6 P.M. on the preceding day. Entries for Evening Jumping may be received till the beginning of the Competition.
3. *Entry Fees.*—Wednesday, £1; Thursday and Friday, 10s. for each class. Evening Jumping, 10s.
4. *Accommodation* for jumping horses will be provided as follows: Covered shed in which to stand during the day free of charge; or, on application to the Secretary not less than ten days before the opening of the Show, stalls or loose-boxes will be provided at a charge (in addition to the Entry Fee) of £2 for a stall and £3 for a loose-box, which must be paid along with the Entry Fee at the time of application.
5. Horses entered for jumping only need not enter the Showyard till 12 noon on the day of Competition, and may leave the Showyard at the close of the jumping.
6. *The Jumps* may consist of Single Hurdle, Gate, Double Hurdle, Wall, and Water Jump, power being reserved by the Society to alter these, as well as the Handicaps, as may be thought desirable.

CLASS		*First*	*Second*	*Third*	*Fourth*	*Fifth*
	WEDNESDAY.	£	£	£	£	£
1	**Horse or Pony** any height	20	15	10	5	3
	THURSDAY.					
2	**Horse or Pony** any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1	10	8	5	3	2
	FRIDAY.					
3	**Horse or Pony** any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2	10	8	5	3	2
	Champion Prize for most points in Prizes with one or more horses in above Classes—First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; and Fifth Prize, one point—the money to be evenly divided in the event of a tie	10	—	—	-	-
	THURSDAY EVENING.					
4	**Horse or Pony** any height	10	8	5	3	2
	Total Prize Money for Jumping, £147					

Special Entry Forms for above Competitions to be had on application.

ENTRY FEES		*CLASS*		*PREMIUMS*			
Members	*Non-Members*			*First*	*Second*	*Third*	*Fourth*
			SHEEP	£	£	£	£
			BLACKFACE				
			President's Medal for best animal of Blackface breed				
			[1] **Fife and Kinross Perpetual Gold Challenge Cup,** value £200, for best Blackface animal, "Extra Stock" being eligible to compete.				
20/-	30/-	84	**Tup** above one shear	12	8	4	2
20/-	30/-	85	**Shearling Tup**	12	8	4	2
20/-	30/-	86	***Shearling Tup,** which shall have been entirely outwintered, and which shall not have been clipped *before* 1st May 1921	12	8	4	2
20/-	30/-	87	**Ewe** above one shear, with her Lamb at foot	10	5	2	–
20/-	30/-	88	**Shearling Ewe or Gimmer**	10	5	2	–
			PRIZE MONEY BY SOCIETY . . £112				
			CHEVIOT				
			President's Medal for best animal of the Cheviot breed				
20/-	30/-	89	**Tup** above one shear	12	8	4	2
20/-	30/-	90	**Shearling Tup**	12	8	4	2
20/-	30/-	91	**Ewe** above one shear, with her Lamb at foot	10	5	2	–
20/-	30/-	92	**Shearling Ewe or Gimmer**	10	5	2	-
			[2] **Perpetual Challenge Cup,** value £25, gifted by Mr J. Borthwick, for best Sheep in the Cheviot classes.				
			PRIZE MONEY BY SOCIETY . . £86				
			BORDER LEICESTER				
			President's Medal for best animal of Border Leicester breed				
20/-	30/-	93	**Tup** above one shear	12	8	4	2
20/-	30/-	94	**Shearling Tup**	12	8	4	2

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* A formal Declaration must be made at time of entry that the conditions both as regards outwintering and clipping have been strictly adhered to.

[1] This Cup, along with an endowment of £400, was subscribed for by the Counties of Fife and Kinross in commemoration of the Society's first Show at Cupar-Fife in 1912. This year the Cup is offered for the best Blackface animal. The animal winning the Cup must be certified free from hereditary disease. The winner of the Cup shall, before delivery thereof is made to him, give security to the Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so. The winner of the Cup on each occasion will receive a miniature replica in silver as a memento of his winning the Cup.

[2] Given by Cheviot Sheep Society.

ENTRY FEES		*CLASS*		*PREMIUMS*		
Members	*Non-Members*		**SHEEP**	*First*	*Second*	*Third*
			BORDER LEICESTER—*continued*	£	£	£
			[1] **Gold Medal** for best male animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible.			
20/-	30/-	95	**Ewe** above one shear	10	5	2
20/-	30/-	96	**Shearling Ewe or Gimmer**	10	5	2
			[1] **Gold Medal** for best female animal in the Border Leicester Classes, registered or eligible for registration in the Border Leicester Flock-Book. Animals entered as "Extra Stock" not eligible.			
			PRIZE MONEY BY SOCIETY . . £86			
			HALF-BRED			
			President's Medal for best Half-Bred Animal			
20/-	30/-	97	**Tup** above one shear	10	7	3
20/-	30/-	98	**Shearling Tup**	10	7	3
20/-	30/-	99	**Ewe** above one shear	10	5	2
20/-	30/-	100	**Shearling Ewe or Gimmer**	10	5	2
20/-	30/-	101	**Three Ewe Lambs**	5	3	2
			PRIZE MONEY BY SOCIETY . . £84			
			OXFORD-DOWN			
			(All sheep to be entered or eligible for entry in the Flock-Book.)			
			President's Medal for best Oxford-Down Animal			
			[2] **Roberton Challenge Cup**, value £50, for the best Oxford-Down animal bred in Scotland, to be won three times by the same owner, but with different sheep, before becoming his property.			
20/-	30/-	102	**Shearling Tup**	8	5	3
20/-	30/-	103	**Shearling Ewe or Gimmer**	8	5	3
20/-	30/-	104	**Tup Lamb**	8	5	3
20/-	30/-	105	**Three Ewe Lambs**	8	5	2
			PRIZE MONEY BY SOCIETY . . £42			
			[2] CONTRIBUTED PRIZES 21			

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[1] Given by the Society of Border Leicester Sheep-Breeders.

[2] Given by Oxford-Down Sheep-Breeders' Association.

ENTRY FEES		*CLASS*	SHEEP	*PREMIUMS*		
Members	*Non-Members*		**SUFFOLK**	*First*	*Second*	*Third*
			(*All sheep to be entered or eligible for entry in the Flock-Book.*)	£	£	£
			President's Medal for best Suffolk Sheep			
20/-	30/-	106	**Shearling Tup**	8	5	3
20/-	30/-	107	**Shearling Ewe or Gimmer**	8	5	3
20/-	30/-	108	**Tup Lamb**	8	5	3
			[1] **Special Prize of £5, 5s.** for best Tup Lamb, bred in Scotland.			
20/-	30/-	109	**Three Ewe Lambs**	8	5	2
			[1] **Special Prize of £5, 5s.** for best pen of Ewe Lambs, bred in Scotland.			
			[2] **Special Prize of £10, 10s.** for best group comprising Tup, Ewe, Tup Lamb, and Ewe Lamb entered in above classes.			
			Prize Money by Society £38			
			[3] Contributed Prizes 25			
			Special Prizes 21			
			SHROPSHIRE			
			President's Medal for best Shropshire Animal			
20/-	30/-	110	**Shearling Tup**	6	4	2
20/-	30/-	111	**Shearling Ewe or Gimmer**	5	3	2
			Prize Money by Society £22			
			FAT SHEEP			
20/-	30/-	112	**Three Fat Lambs,** any breed or cross, dropped in the year of the Show	5	3	2
			Prize Money by Society £480			
			Contributed 67			
			Cups, Medals, &c. 295			
			Total Prizes for Sheep £842			

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[1] Given by Mr S. R. Sherwood, Playford, Ipswich.
[2] Given by Mr Dugald M'Kechnie, Glasgow.
[3] Given by the Suffolk Sheep Society.

*GOATS

President's Medal for best animal in the Goat Classes

(*All animals must be registered—see page 76*)

ENTRY FEES		CLASS		PREMIUMS		
Members	*Non-Members*			*First*	*Second*	*Third*
				£	£	£
			OPEN CLASSES			
			[1] **Challenge Cup**, value 20 Guineas, for the best Female Goat in the Show.			
			[2] **Challenge Cup**, value £10, for best Female Anglo-Nubian Goat over two years old, in milk, entered in the Anglo-Nubian section of the Herd-Book, "Extra Stock" being eligible to compete.			
5/-	10/	113	**Male Goat**, any variety, over one year . .	3	2	1
5/-	10/-	114	**Female Goat**, any variety, over two years . .	3	2	1
5/-	10/-	115	**Goatling**, any variety, over one and not exceeding two years	3	2	1
5/-	10/-	116	**Male Kid**, any variety, not exceeding one year .	3	2	1
5/-	10/-	117	**Female Kid**, any variety, not exceeding one year .	3	2	1
5/-	10/-	118	† **Milking Competition**, open to Classes 114 and 120 (animals two years and over) . . .	3	2	1
			CONFINED TO SCOTTISH EXHIBITORS			
5/-	10/-	119	**Male Goat**, any variety, one year old and over .	3	2	1
5/-	10/-	120	[3] **Female Goat**, in milk, any age . . .	3	2	1

PRIZE MONEY BY SOCIETY . . .	£25
BOARD OF AGRICULTURE FOR SCOTLAND . .	12
PRIZE MONEY BY THE BRITISH GOAT SOCIETY .	5
PRIZE MONEY BY THE BARONESS BURTON .	6
CUPS	31
Total Prizes for Goats . .	£79

The Competition for Goats is recognised by the British Goat Society, 6 Fenchurch Street, London, E.C., which will give three Challenge Certificates (qualifying for a Championship) for the best Male Goat not under one year old, for the best Female Goat over two years old, and for the best dual purpose Goat.

[1] Given by Lord Dewar, London—to be competed for annually.

[2] Given by Mrs S. Macdonald, Garrochty—to be competed for annually.

[3] Given by the Baroness Burton, Dochfour.

† The milk yielded by goats in the Showyard shall be the property of the Society.

* For Regulations see pages 76, 77.

*PIGS

LARGE WHITE

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First £	PREMIUMS Second £	PREMIUMS Third £
			President's Medal for best Large White Pig			
			[1] **Gold Medal,** value £5, for the best Large White Boar in the Show.			
20/-	30/-	121	**Boar** farrowed before 1920	8	4	2
20/-	30/-	122	**Boar** farrowed in 1920	8	4	2
20/-	30/-	123	**Boar** farrowed in 1921	6	3	1
			[1] **Gold Medal,** value £5, for the best Large White Sow in the Show.			
20/-	30/-	124	**Sow** farrowed before 1920	8	4	2
20/-	30/-	125	**Sow** farrowed in 1920	8	4	2
20/-	30/-	126	**Sow** farrowed in 1921	6	3	1
			PRIZE MONEY BY SOCIETY . . £76			

MIDDLE WHITE

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First £	PREMIUMS Second £	PREMIUMS Third £
			President's Medal for best Middle White Pig			
			[1] **Gold Medal,** value £5, for the best Middle White Boar in the Show.			
20/-	30/-	127	**Boar,** any age	8	4	2
20/-	30/-	128	**Boar** farrowed in 1921	6	3	1
			[1] **Gold Medal,** value £5, for the best Middle White Sow in the Show.			
20/-	30/-	129	**Sow,** any age	8	4	2
20/-	30/-	130	**Sow** farrowed in 1921	6	3	1
			PRIZE MONEY BY SOCIETY . . £48			

BERKSHIRE

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First £	PREMIUMS Second £	PREMIUMS Third £
			President's Medal for best Berkshire Pig			
			[2] **Champion Prize** of £10 for the best animal in the Berkshire Classes.			
20/-	30/-	131	**Boar,** any age	8	4	2
20/-	30/-	132	**Boar** farrowed in 1921	6	3	1
20/-	30/-	133	**Sow,** any age	8	4	2
20/-	30/-	134	**Sow** farrowed in 1921	6	3	1
			PRIZE MONEY BY SOCIETY . . £48			

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* See Rule 35.

[1] Given by the National Pig Breeders' Association.

[2] Given by the British Berkshire Society.

PIGS

LARGE BLACK

President's Medal for best Large Black Pig

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First	PREMIUMS Second	PREMIUMS Third
				£	£	£
20/-	30/-	135	**Boar**, any age	8	4	2
20/-	30/-	136	**Boar** farrowed in 1921	6	3	1
20/-	30/-	137	**Sow**, any age	8	4	2
20/-	30/-	138	**Sow**, farrowed in 1921	6	3	1
			PRIZE MONEY BY SOCIETY . £24			
			[1] CONTRIBUTED PRIZES . . 24			

GLOUCESTERSHIRE OLD SPOTS

President's Medal for best Gloucestershire Old Spot Pig.

[2] **Silver Challenge Trophy**, value Forty Guineas, for best Gloucestershire Old Spot Animal.

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First	PREMIUMS Second	PREMIUMS Third
20/-	30/-	139	**Boar**, any age	8	4	2
20/-	30/-	140	**Boar** farrowed in 1921	6	3	1
20/-	30/-	141	**Sow**, any age	8	4	2
20/-	30/-	142	**Sow** farrowed in 1921	6	3	1
			PRIZE MONEY BY SOCIETY . . £33			
			[2] CONTRIBUTED PRIZES . . 15			

CUMBERLAND

President's Medal for best Cumberland Pig.

ENTRY FEES Members	ENTRY FEES Non-Members	CLASS		PREMIUMS First	PREMIUMS Second	PREMIUMS Third
20/-	30/-	143	**Boar**, any age	8	4	2
20/-	30/-	144	**Boar** farrowed in 1921	6	3	1
20/-	30/-	145	**Sow**, any age	8	4	2
20/-	30/-	146	**Sow** farrowed in 1921 . . .	6	3	1
			PRIZE MONEY BY SOCIETY . . £24			
			[3] CONTRIBUTED PRIZES . . 24			
			PRIZE MONEY BY SOCIETY . . . £253			
			CONTRIBUTED 73			
			CUPS, MEDALS, &c. 62			
			Total Prizes for Pigs . . . £388			

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[1] Given by Large Black Pig Society.
[2] Given by the Gloucestershire Old Spots Pig Society.
[3] Given by the Cumberland Pig Breeders' Association.

EXTRA STOCK

Animals not included in the Classes for Competition may be exhibited as Extra Stock and may receive Awards as follows:—Very Highly Commended, the Silver Medal; Highly Commended, the Medium Silver Medal; Commended, the Bronze Medal.

Animals entered as Extra Stock are eligible to compete for the President's Medals, whether former winners of these Medals or not. They are also eligible to compete for Special Prizes where the conditions of these prizes permit.

Entry fees—same as corresponding Classes.

POULTRY

[1] **Champion Challenge Bowl**, value £50, for the best exhibit in the Poultry Classes.

First Premium—ONE SOVEREIGN; *Second Premium*—TEN SHILLINGS. In each Class in which there are six or more pens competing, a Third Prize of Five Shillings may be awarded, provided there is sufficient merit in the pens. Three or more Commendations may also be given—thus, Very Highly Commended, Highly Commended, and Commended.

Champion Medals are offered as follows:—

1. Best Cock, any Variety.
2. Best Hen, any Variety.
3. Best Cockerel, any Variety.
4. Best Pullet, any Variety.
5. Best Waterfowl.
6. Best Turkey.

Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

Entry Fees—Members, 3s.; Non-Members, 5s.

	Class	
LEGHORN—		
White	1.	Cock
	2.	Hen
	3.	Cockerel
	4.	Pullet
Any other Colour	5.	Cock
	6.	Hen
	7.	Cockerel
	8.	Pullet
MINORCA	9.	Cock
	10.	Hen
	11.	Cockerel
	12.	Pullet
SCOTCH GREY	13.	Cock
	14.	Hen
	15.	Cockerel
	16.	Pullet
PLYMOUTH ROCK—		
Barred	17.	Cock
	18.	Hen
	19.	Cockerel
	20.	Pullet
Any other Colour	21.	Cock or Cockerel
	22.	Hen or Pullet
ORPINGTON—		
Black	23.	Cock
	24.	Hen
	25.	Cockerel
	26.	Pullet
Buff	27.	Cock
	28.	Hen
	29.	Cockerel
	30.	Pullet
White	31.	Cock
	32.	Hen
	33.	Cockerel
	34.	Pullet
WYANDOTTE—		
Gold or Silver	35.	Cock
	36.	Hen
WYANDOTTE—*continued*		
Gold or Silver	37.	Cockerel
	38.	Pullet
White	39.	Cock
	40.	Hen
	41.	Cockerel
	42.	Pullet
Partridge	43.	Cock or Cockerel
	44.	Hen or Pullet
Any other Colour	45.	Cock or Cockerel
	46.	Hen or Pullet
RHODE ISLAND RED	47.	Cock
	48.	Hen
	49.	Cockerel
	50.	Pullet
FAVEROLLES	51.	Cock
	52.	Hen
	53.	Cockerel
	54.	Pullet
SUSSEX—		
Light	55.	Cock
	56.	Hen
	57.	Cockerel
	58.	Pullet
Any other Variety	59.	Cock
	60.	Hen
	61.	Cockerel
	62.	Pullet
DORKING—		
Coloured	63.	Cock
	64.	Hen
	65.	Cockerel
	66.	Pullet
Silver Grey	67.	Cock
	68.	Hen
	69.	Cockerel
	70.	Pullet

Special Entry Forms for Poultry Classes.

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[1] Given by the Proprietors of 'The Scottish Poultry News,' Aberdeen. The Bowl will become the property of the exhibitor who shall win it three times, not necessarily in succession. A Silver Medal will be awarded to the winner each year.

	Class	
SCOTS DUMPY . . .	71.	Cock or Cockerel
	72.	Hen or Pullet
INDIAN GAME . . .	73.	Cock
	74.	Hen
	75.	Cockerel
	76.	Pullet
OLD ENGLISH GAME . .	77.	Cock
	78.	Hen
	79.	Cockerel
	80.	Pullet
BANTAM—		
Game	81.	Cock
	82.	Hen
Other than Game . .	83.	Cock
	84.	Hen
Any other recognised Breed	85.	Cock
	86.	Hen
	87.	Cockerel
	88.	Pullet
CROSS-BRED FOWLS FOR LAYING PURPOSES . . .	89.	Hen
	90.	Pullet
DUCKS—		
Aylesbury	91.	Drake
	92.	Duck

	Class	
DUCKS—*continued*		
Orpington	93.	Drake
	94.	Duck
Indian Runner . . .	95.	Drake
	96.	Duck
Any other Variety . .	97.	Drake
	98.	Duck
GEESE	99.	Gander
	100.	Goose
TURKEYS	101.	Cock
	102.	Hen
TABLE POULTRY—		
(*a*) TABLE FOWLS— *Any pure Breed*	103.	Pair of Cockerels
	104.	Pair of Pullets
Game-Cross .	105.	Pair of Cockerels
	106.	Pair of Pullets
Any other Cross .	107.	Pair of Cockerels
	108.	Pair of Pullets
(*b*) DUCKLINGS FOR TABLE PURPOSES— *Any Breed or Cross*	109.	Pair of Ducklings

AMOUNT OF POULTRY PREMIUMS, £190, 15s.

Special Entry Forms for Poultry Classes.

DAIRY PRODUCE

No Exhibitor to show more than one lot in any Class.

Entry Fees—Members, 6s.; Non-Members, 9s.

Class		Premiums. 1st.	2nd.	3rd.	
		£	£	£	
1.	Powdered Butter, not less than 3 lb.	4	2	1	
2.	Fresh Butter, three 1-lb. rolls	4	2	1	
					£14
3.	Cheddar Cheese, 56 lb. and upwards—£6, £4, £2, £1				13
4.	Sweet-Milk Cheese, flat shape (from a dairy where all cheese is made flat shape), white in colour, made according to the Dunlop or other method—£4, £2, £1 .				7
5.	Cheese, 14 lb. and under—£3, £2, £1				6
					. £40

Special Entry Forms for Dairy Produce.

*BEE APPLIANCES AND HONEY, &c.

OPEN CLASSES.

APPLIANCES

Entry Fees—2s. 6d. each.

Class		Premiums. 1st.	2nd.	3rd.
1.	Collection of Hives and Appliances, to include amongst other articles the following:—Three Standard Frame Hives complete, fitted with arrangements for supering. A suitable outfit for a beginner in Bee-Keeping (this to be staged separate from the main outfit). Prices—at which the exhibitor must agree to supply similar articles for six months—to be affixed to each article. Fifty superficial feet allowed for staging	80/-	40/-	20/-
2.	Best and most complete Standard Frame Hive for general use, unpainted	20/-	15/-	10/-
3.	Best and most complete Standard Frame Hive for Cottager's use, unpainted, price not to exceed 35/-	20/-	15/-	10/-
4.	Any new Appliance connected with Bee-Keeping to which no prize has been awarded at any previous Highland show	10/-	5/-	–

HONEY, &c.

Entry Fees—2s. 6d. each

Class		1st.	2nd.	3rd.
5.	Six Sections of Comb Honey	20/-	15/-	10/-
6.	Six Jars of Run or Extracted Light-Coloured Honey, approximate weight 6 lb.	20/-	15/-	10/-
7.	Six Jars of Run or Extracted Medium or Dark-Coloured Honey, excluding Heather, approximate weight 6 lb.	20/-	15/-	10/-
8.	Six Jars of pressed Heather Honey in liquid form, approximate weight 6 lb.	20/-	15/-	10/-
9.	Six Jars of Granulated Honey, approximate weight 6 lb.	20/-	15/-	10/-
10.	One shallow frame of Comb Honey for extracting purposes	20/-	15/-	10/-
11.	Products made with the aid of Honey. Recipe to be attached	20/-	15/-	10/-
12.	Best display of Honey in any form staged in space 3 feet by 3 feet, height from table not exceeding 4 feet. Weight of honey not to exceed 100 lb.	60/-	30/-	20/-
13.	Best exhibit of not less than 1 lb. of Wax in any form	20/-	15/-	10/-
14.	Best exhibit of not less than 1 lb. of Wax made into shapes for retail trade and over-counter trade	20/-	15/-	10/-
15.	Observatory Hive with Queen and Bees	50/-	30/-	15/-
16.	Exhibit of a scientific nature not mentioned in the foregoing classes, to which no prize has been awarded at any previous Highland Show	20/-	15/-	10/-

(Confined to Scottish Exhibitors.)

Class		1st.	2nd.	3rd.
17.	Six Sections of Comb Honey	30/-	20/-	10/-
18.	Six Jars of Run or Extracted Medium or Dark-Coloured Honey, approximate weight 6 lb.	30/-	20/-	10/-
19.	Six Jars of Run or Extracted Light-Coloured Honey, approximate weight 6 lb.	30/-	20/-	10/-

The Rosebery Silver and Bronze Medals respectively will be awarded by the Scottish Bee-Keepers' Association to the winners of the greatest number of points in Honey Classes, calculated on the following basis: 1st prize, 3 points; 2nd prize, 2 points; 3rd prize, 1 point. Winners must be at the time members or affiliated to the Scottish Bee-Keepers' Association.

PRIZE MONEY BY SOCIETY	£26, 15s. 0d.
CONTRIBUTED BY SCOTTISH BEE-KEEPERS' ASSOCIATION	£26, 15s. 0d.

Special Entry Forms for Appliances and Honey.

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* For Regulations as to exhibits see page 77.

WOOL

THREE *Fleeces in each Entry and must be shown entire.* *Entry Fee*, 6s.

PURE BREED CLASSES

Class		Premiums. 1st.	2nd.	3rd.
	BLACKFACE.	£	£	£
1.	*Ewe*	3	2	1
2.	*Wedder*	3	2	1
3.	*Hogg*	3	2	1
	CHEVIOT.			
4.	*Ewe*	3	2	1
5.	*Hogg*	3	2	1
	BORDER LEICESTER.			
6.	*Ewe*	3	2	1
7.	*Hogg*	3	2	1
	HALF-BRED.			
8.	*Ewe*	3	2	1
9.	*Hogg*	3	2	1
	*SHETLAND.			
10.	*Ewe*	3	2	1
11.	*Hogg*	3	2	1
				£66

TOTAL PRIZE MONEY FOR WOOL, £66.

Cheviot, Border Leicester, and Half-Bred Fleeces must be shown washed, and Blackface and Shetland Fleeces unwashed. All Fleeces must be shorn in the year of the Show from sheep bred and reared on, or regular stock of, the exhibitor's farm.

Special Entry Forms for Wool Classes.

* An exhibit of Shetland Wool may comprise fleeces of one or more colours, but each fleece must be self-coloured

ABSTRACT OF PREMIUMS.

(Champion Medals given by his Grace THE DUKE OF MONTROSE, K.T.)

GIVEN BY THE SOCIETY

	£	s.	d.
Cattle	£863	0	0
Horses	791	0	0
Jumping Competitions	147	0	0
Sheep	480	0	0
Goats	25	0	0
Pigs	253	0	0
Poultry	190	15	0
Dairy Produce	40	0	0
Bee Appliances and Honey	26	15	0
Wool	66	0	0
Medals to Breeders, &c.	20	0	0
Prizes for Timber[1]	20	0	0
Carry forward	£2922	10	0

Grant to Royal Scottish Arboricultural Society for Prizes for Timber.

ABSTRACT OF PREMIUMS—*continued*

Brought forward		£2922 10 0

CONTRIBUTED PRIZES, CUPS, &c.

The Duke of Montrose, K.T.—Champion Medals		30 0 0

CATTLE.

*Renfrewshire Perpetual Gold Challenge Cup	£250 0 0	
Tweeddale Gold Medal	25 0 0	
The Shorthorn Society, and 2 Medals	40 0 0	
*Mr William Duthie, Collynie, Tarves	150 0 0	
*Mr Emilio R. Casares, jun., London	50 0 0	
*The late Sir George Macpherson Grant, Bart.	50 0 0	
*The late Sir John Macpherson Grant, Bart.	50 0 0	
Aberdeen-Angus Cattle Society	10 0 0	
*"Dr Gillespie" Memorial Challenge Trophy	50 0 0	
*Highland Cattle Society of Scotland (approximate)	89 5 0	
Ayrshire Cattle Herd-Book Society	20 0 0	
Board of Agriculture for Scotland	30 0 0	
British Friesian Cattle Society	63 0 0	
Mr Adam Smith, Lochlands, Larbert	25 0 0	
		902 5 0

HORSES.

*Paisley Perpetual Gold Challenge Cup	£300 0 0	
"William Taylor" Memorial Committee	10 0 0	
*Cawdor Challenge Cup	52 10 0	
Hunters' Improvement and National Light Horse Breeding Society	10 10 0	
Hackney Horse Society	15 0 0	
Board of Agriculture for Scotland	40 0 0	
National Pony Society	15 0 0	
"Four Lovers of Breed" (Shetland Ponies)	10 0 0	
Shetland Pony Stud-Book Society (Medal).		
Collected by Mr W. S. Miller, Balmanno Castle	120 0 0	
		573 0 0

SHEEP.

*Fife and Kinross Perpetual Gold Challenge Cup	£200 0 0	
*Borthwick Challenge Cup	25 0 0	
Society of Border Leicester Sheep-Breeders	20 0 0	
*"Roberton" Challenge Cup	50 0 0	
Oxford-Down Sheep-Breeders' Association	21 0 0	
Suffolk Sheep Society	25 0 0	
Mr S. R. Sherwood, Playford, Ipswich	10 10 0	
Mr Dugald M'Kechnie, Glasgow	10 10 0	
		362 0 0

GOATS.

Board of Agriculture for Scotland	£12 0 0	
British Goat Society	5 0 0	
The Baroness Burton	6 0 0	
*Lord Dewar	21 0 0	
*Mrs S. M'Donald, Garrochty	10 0 0	
		54 0 0

PIGS.

National Pig Breeders' Association	£20 0 0	
British Berkshire Society	10 0 0	
Large Black Pig Society	24 0 0	
*Gloucestershire Old Spots Pig Society (Trophy £42, Cash £15)	57 0 0	
Cumberland Pig Breeders' Association	24 0 0	
		135 0 0

POULTRY.

*Proprietors of 'The Scottish Poultry News,' Aberdeen		50 0 0

BEE APPLIANCES AND HONEY.

Scottish Bee-Keepers' Association		26 15 0
		£5055 10 0

* Challenge Prizes.

JOHN STIRTON, *Secretary*.

3 GEORGE IV. BRIDGE,
EDINBURGH, 2*nd March* 1921.

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